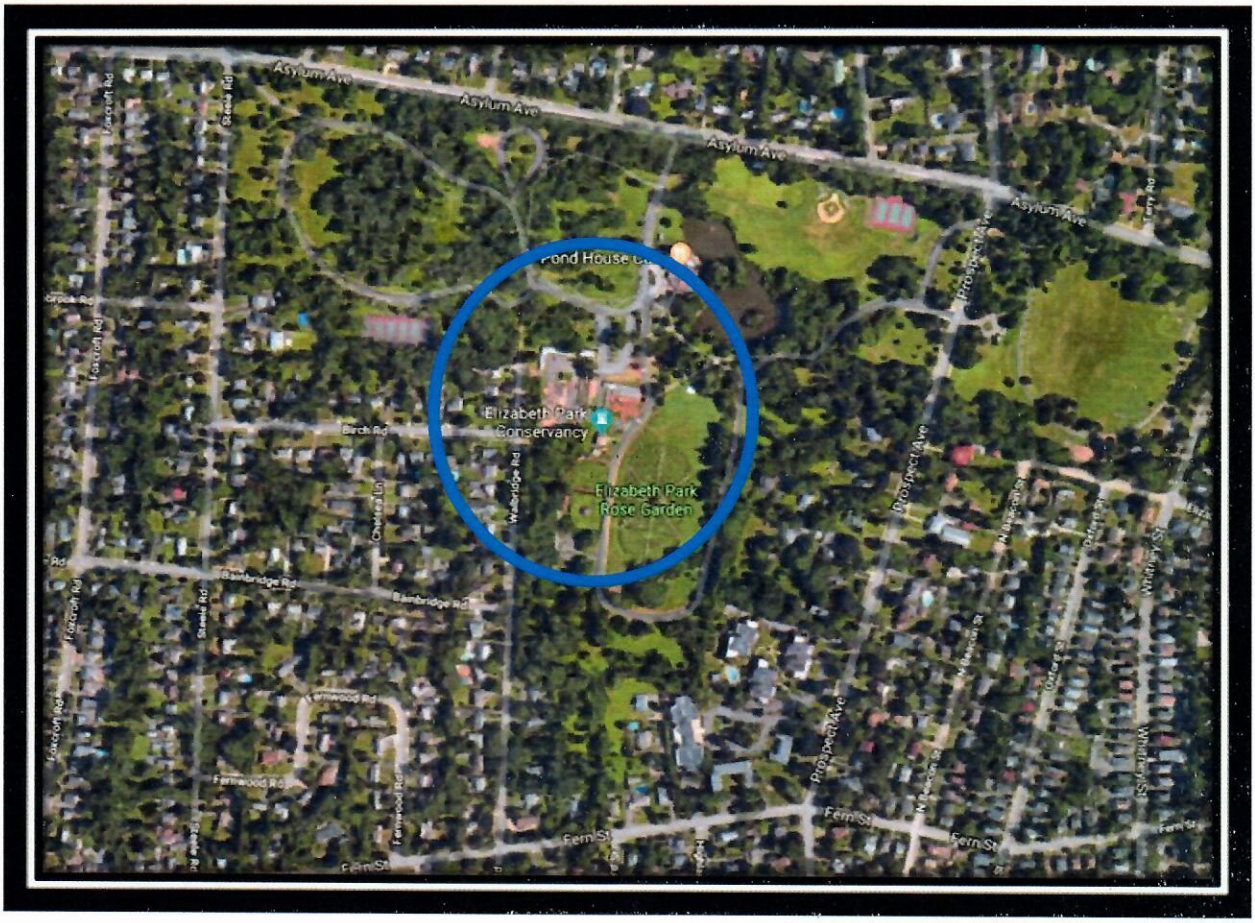


ENGINEERING REPORT

ELIZABETH PARK
VISITORS CENTER PARKING LOT AND MAINTENANCE YARD

1563 ASYLUM AVENUE

WEST HARTFORD, CONNECTICUT

February 21, 2020
Rev. March 23, 2020

Robert Green Associates, LLC
6 Old Waterbury Road
Terryville, Connecticut 06786

Joseph M. Green P.E.
Reg. No. 0026292

ENGINEERING REPORT

ELIZABETH PARK PARKING LOT CONSTRUCTION

ASYLUM AVENUE

WEST HARTFORD, CONNECTICUT

TABLE OF CONTENTS

Project Engineering Report

The Elizabeth Park Conservancy proposes to construct a new parking lot and to redefine the existing maintenance yard in the vicinity of the existing maintenance building on this property. Stormwater runoff from the proposed parking lot is proposed to sheetflow off the paved parking surface to a water quality basin created by excavating the basin approximately 70 feet from Walbridge Road. The volume of the WQB is equal to the volume of runoff generated from the first inch of a storm event on the pavement surfaces. The volume required is 2254 cubic feet and the volume provided is 2572 cubic feet. The top of the berm is proposed to be at elevation 125.0. The maximum depth of water in the water quality basin is approximately 18 inches. An overflow weir is proposed to direct flow out of the containment area toward Walbridge Road. The overflow from the water quality basin reaches the east gutterline of Walbridge Road approximately 10 feet north of the existing concrete pedestrian ramp opposite Birch Road. The flow will continue down the east gutter to the low point in Walbridge Road between Birch Road and Bainbridge Road.

A Pre-Post stormwater assessment was prepared to compare the difference in the existing and the proposed conditions of surface runoff from this property to Walbridge Road. The assessment concluded that there would be a decrease in the amount of surface runoff from the park. The following table summarizes the Pre-Post flows related to the proposed work for the surface flows:

SURFACE FLOWS	2-Year Event	5-Year Event	10-Year Event	25-Year Event	50-Year Event	100-Year Event
Pre-Construction	3.177 cfs	5.049 cfs	6.664 cfs	8.894 cfs	10.64 cfs	12.39 cfs
Post-Construction Surface Flow	2.314 cfs	3.234 cfs	4.024 cfs	5.128 cfs	5.995 cfs	6.87 cfs
Delta in Flow	-0.863 cfs	-1.815 cfs	-2.64 cfs	-3.766 cfs	-4.645 cfs	-5.52 cfs
Delta in Flow (%)	-27.16%	-35.95%	-39.62%	-42.34%	-43.66%	-44.55%

The following table summarizes the Pre-Post flows related to the proposed work for the drainage system flows:

SYSTEM FLOWS	2-Year Event	5-Year Event	10-Year Event	25-Year Event	50-Year Event	100-Year Event
Pre-Construction	3.177 cfs	5.049 cfs	6.664 cfs	8.894 cfs	10.64 cfs	12.39 cfs
Post-Construction Surface Flow	3.747 cfs	5.113 cfs	6.249 cfs	7.792 cfs	8.983 cfs	10.17 cfs
Delta in Flow	+0.57 cfs	+0.064 cfs	-0.415 cfs	-1.102 cfs	-1.657 cfs	-2.22 cfs
Delta in Flow (%)	+17.94%	+1.27%	-6.23%	-12.39%	-15.57%	-17.92%

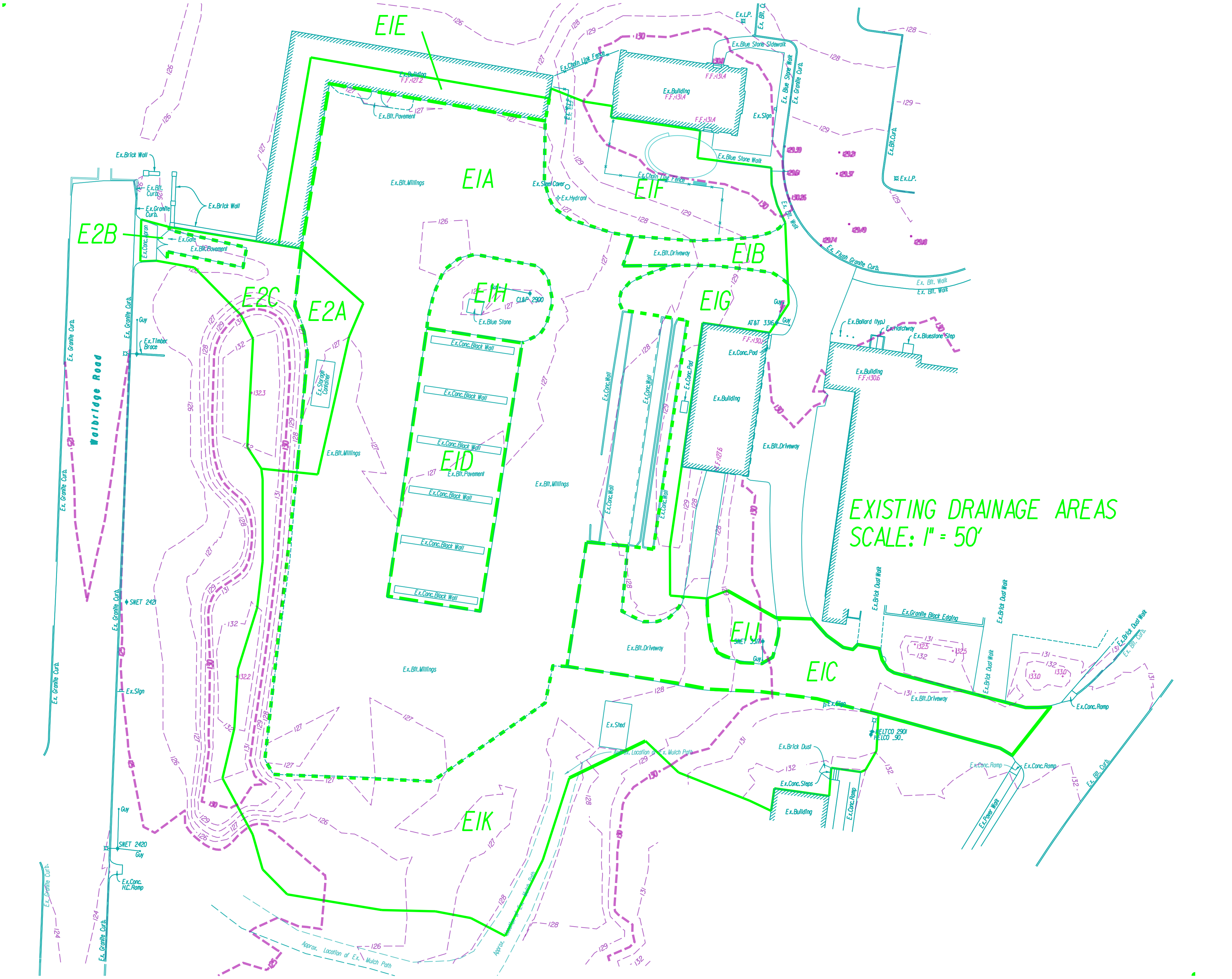
The system analysis was done to reflect the future condition for the maintenance yard runoff being piped to the Town storm manhole at the Birch Road intersection with Walbridge Road. The walkway between the greenhouses was not modeled as the scope there is to replace in-kind.

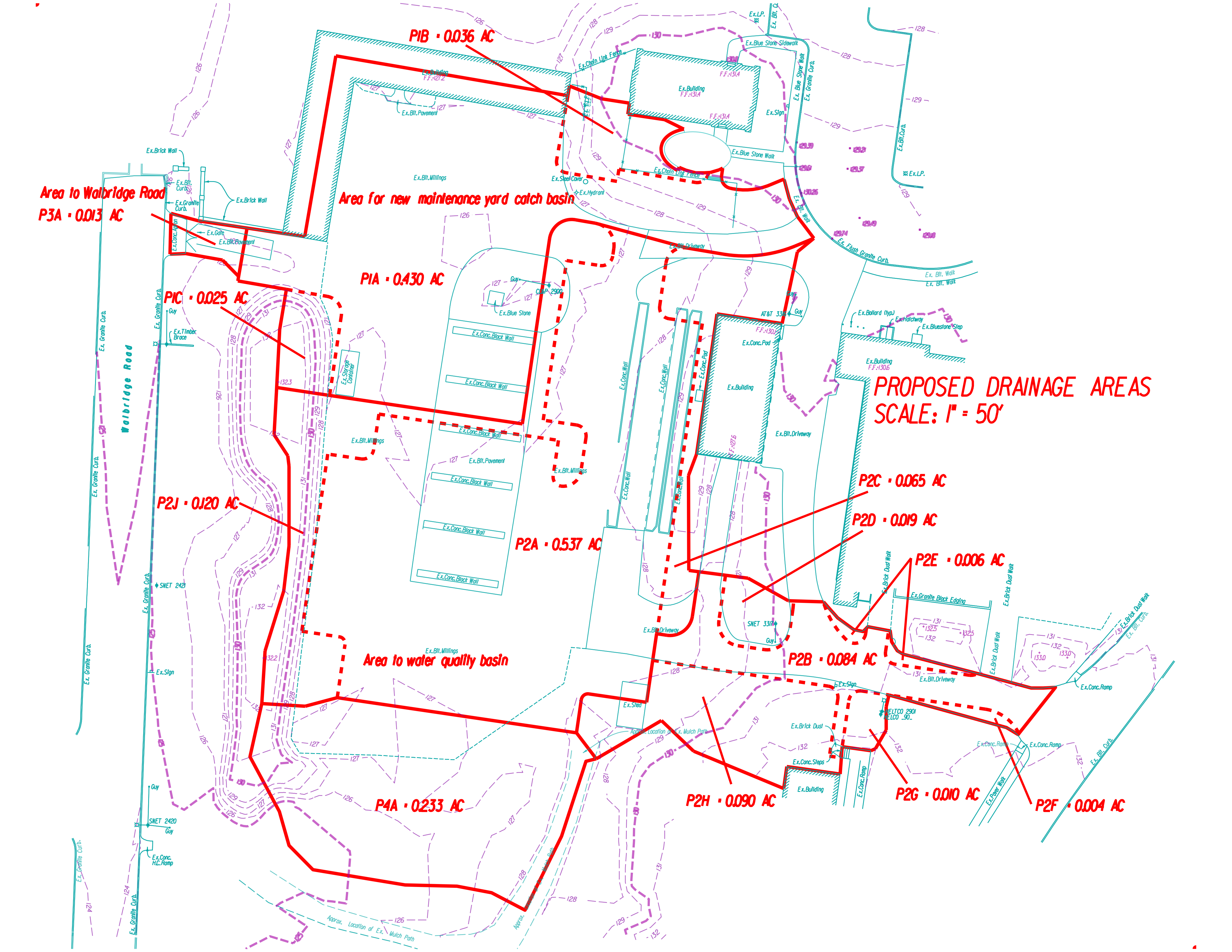
The proposed parking lot is no closer than 12 feet to the wetland limits at wetland marker WLA3.

Runoff from the main north-south driveway and connected parking spaces travels over 43 feet along a grass lined swale at the proposed dumpster pad location before entering the water quality basin. Runoff from the balance of the parking lot sheet flows off a 94-foot-long edge of and then across 10-feet of a grassed surface before travelling into the water quality basin. Grade change required for the construction of the proposed parking lot and walkways is very minor. Excavation for the Water Quality Basin ranges from 2 to 3 feet. Test Hole “A” indicated that there’s 20 inches of compost atop 7” of original topsoil sitting atop grey very fine till. There was no evidence of water, mottling, or rock in the 75” deep test hole.

No wetlands are directly impacted by this project.

Stormwater runoff from the maintenance yard is proposed to be collected in a Type “C-L” CB with a 2-foot sump which would discharge directly into an existing Town manhole located at the intersection of Walbridge and Birch Roads. A catchbasin hood is proposed to be installed in front of the discharge pipe in the catchbasin to keep “floatables” in the catchbasin for easier removal by maintenance activity.


EXISTING DRAINAGE AREAS
SCALE: 1" = 50'
E1A
E1B
E1C
E1D
E1E
E1F
E1G
E1H
E1J
E1K
E2A
E2B
E2C
Walbridge Road
Ex. Building
Ex. Bit. Driveway
Ex. Bit. Millings
Ex. Conc. Block Wall
Ex. Blue Stone Walk
Ex. Chain Link Fence
Ex. Granite Curb.
Ex. Brick Wall
Ex. Shed
Ex. Conc. Ramp
Approx. Location of Ex. Mulch Path


PROPOSED DRAINAGE AREAS
SCALE: 1" = 50'
P1B - 0.036 AC
Area to Walbridge Road
P3A - 0.013 AC
Area for new maintenance yard catch basin
P1A - 0.430 AC
P1C - 0.025 AC
P2J - 0.120 AC
P2A - 0.537 AC
Area to water quality basin
P4A - 0.233 AC
P2C - 0.065 AC
P2D - 0.019 AC
P2E - 0.006 AC
P2B - 0.084 AC
P2H - 0.090 AC
P2G - 0.010 AC
P2F - 0.004 AC
Walbridge Road

EXISTING CONDITIONS

3-18-20

CN				
	E1			
89	E1A =	0.709 Ac	IMPERVIOUS	(MILLINGS)
98	E1B =	0.021 Ac	IMPERVIOUS	(PAVEMENT)
98	E1C =	0.124 Ac	IMPERVIOUS	(PAVEMENT)
98	E1D =	0.112 Ac	IMPERVIOUS	(PAVEMENT)
98	E1E =	0.041 Ac	IMPERVIOUS	(ROOF)
63	E1F =	0.103 Ac	PERVIOUS	(GRASS)
63	E1G =	0.067 Ac	PERVIOUS	(GRASS)
79	E1H =	0.037 Ac	PERVIOUS	(GRASS)
63	E1J =	0.017 Ac	PERVIOUS	(GRASS)
61	E1K =	0.355 Ac	PERVIOUS	(GRASS + MULCH)
	E2			
89	E2A =	0.035 Ac	IMPERVIOUS	(MILLINGS)
98	E2B =	0.012 Ac	IMPERVIOUS	(APRON/DW)
69	E2C =	0.061 Ac	PERVIOUS	(MULCH)

PROPOSED CONDITIONS 3-18-20

CN			
	MAINTENANCE YARD – P1		
98	P1A = 0.43 Ac	IMPERVIOUS	(ROOF + LOT)
61	P1B = 0.036 Ac	PERVIOUS	(GRASS)
64	P1C = 0.025 Ac	PERVIOUS	(MULCH)
	PARKING LOT / ACCESS – P2		
98	P2A = 0.537 Ac	IMPERVIOUS	
98	P2B = 0.084 Ac	IMPERVIOUS	
62	P2C = 0.065 Ac	PERVIOUS	(GRASS)
61	P2D = 0.019 Ac	PERVIOUS	(GRASS)
61	P2E = 0.006 Ac	PERVIOUS	(GRASS)
61	P2F = 0.004 Ac	PERVIOUS	(GRASS)
61	P2G = 0.010 Ac	PERVIOUS	(GRASS)
61	P2H = 0.090 Ac	PERVIOUS	(GRASS)
64	P2J = 0.120 Ac	PERVIOUS	(MULCH)
	TO WALBRIDGE - WEST – P3		
62	P3A = 0.013 Ac	PERVIOUS	(GRASS)
	WATER QUALITY BASIN – P4		
61	P4A = 0.233 Ac	PERVIOUS	(GRASS/MULCH)

ELIZABETH PARK PARKING 6.4YS

3-19-20

WATER QUALITY VOLUME

1" RUNOFF OVER PARKING LOT AND PAVED WALKWAYS P2A + P2B

0.537 Ac + 0.084 Ac = 0.621 Ac

= 27,050 SF

WQV = 27,050 SF × 1"/12 in/Ft

= 2254 C.F.

VOLUME PROVIDED

	AREA (S.F.)	SUM	$\frac{1+2}{2}$ × depth
CONTOUR 125	2504		
		4142	2071 CF
CONTOUR 124	1638		
		2003	501 CF
CONTOUR 123.5	365		
		TOTAL VOLUME	2572 CF

STORM DRAIN PIPE

Q_{25} to TYPE C-L CB = 3.19 cfs

(Hydrograph #4)

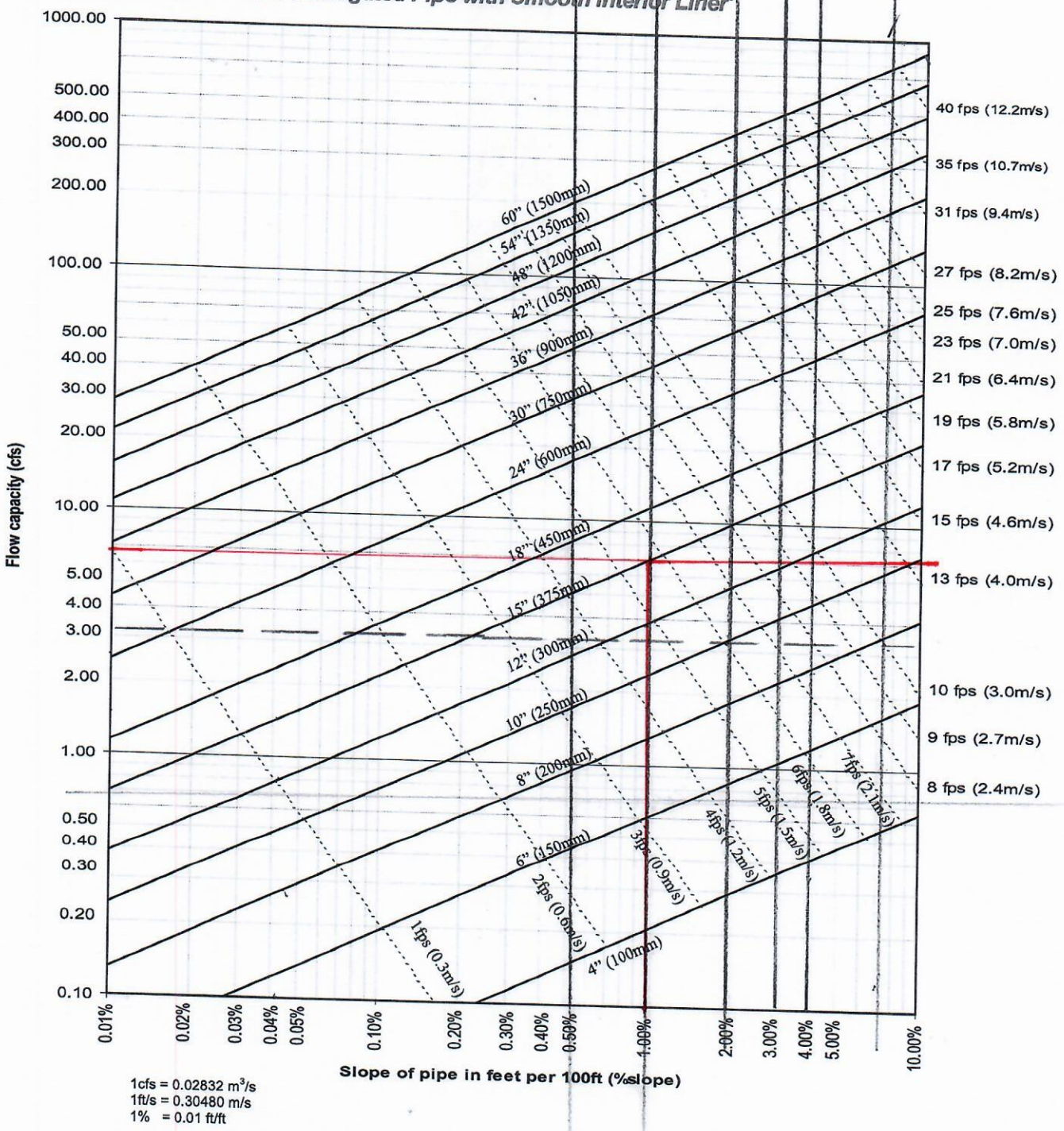
FULL CAPACITY 15" HDPE = 7.5 cfs

@ 1% SLOPE

15" HDPE IS O.K.

See Attached Product Literature

Figure 3-1
Discharge Rates for ADS Corrugated Pipe with Smooth Interior Liner[1]



1cfs = 0.02832 m^3/s
1ft/s = 0.30480 m/s
1% = 0.01 ft/ft

1. Applicable products: N-12®, MEGA GREEN®, N-12 STIB, N-12 WTIB, HP STORM, SaniTIte®, SaniTite HP, N-12 Low Head

Note: Based on a design Manning's "n" of 0.012.
Solid lines indicate pipe diameters. Dashed lines indicate approximate flow velocity.
Redeveloped from FHWA HDS 3 – Design Charts for Open-Channel Flow[2]

Appendix A

Hydrology Studio – Summary Report

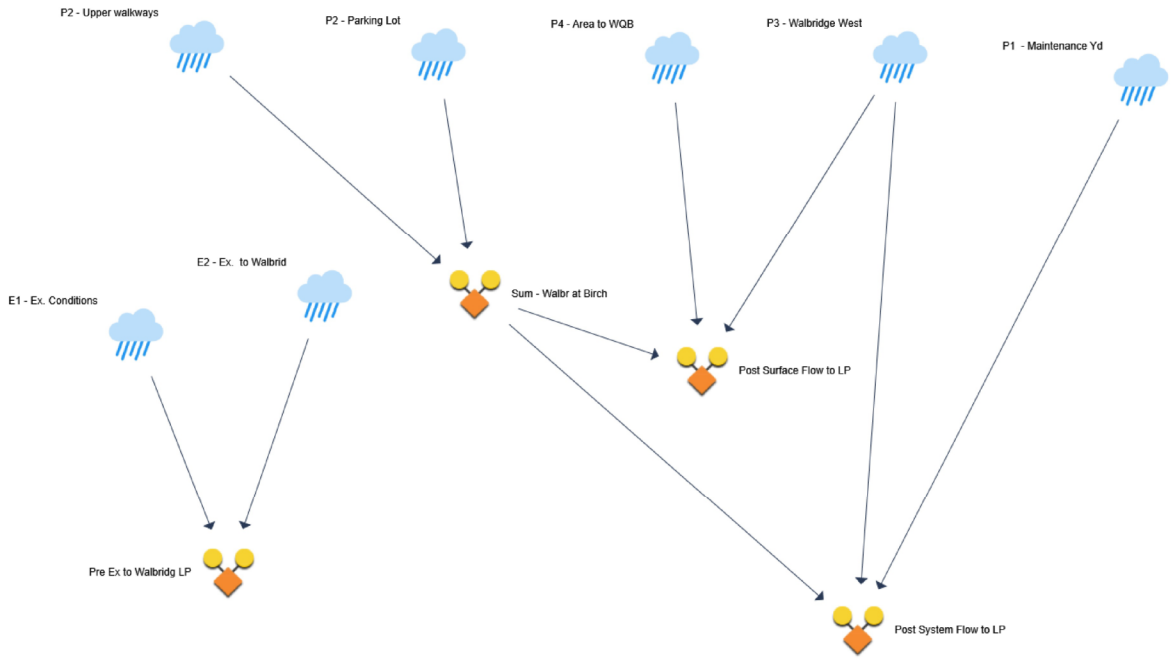
Table of Contents

Basin Model

Hydrology Studio v 1.0.0.0

Project Name: Elizabeth Park Parking

03-19-2020



Hydrograph by Return Period

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	NRCS Runoff	E1 - Ex. Conditions		3.002		4.759	6.274	8.365	10.00	11.64
2	NRCS Runoff	E2 - Ex. to Walbrid		0.176		0.290	0.390	0.529	0.639	0.749
3	Junction	Pre Ex to Walbridg LP		3.177		5.049	6.664	8.894	10.64	12.39
4	NRCS Runoff	P1 - Maintenance Yd		1.485		2.053	2.524	3.161	3.651	4.140
5	NRCS Runoff	P2 - Upper walkways		0.202		0.295	0.373	0.479	0.561	0.643
6	NRCS Runoff	P2 - Parking Lot		2.056		2.750	3.328	4.114	4.722	5.329
7	Junction	Sum - Walbr at Birch		2.257		3.045	3.701	4.594	5.283	5.972
8	NRCS Runoff	P3 - Walbridge West		0.006		0.015	0.024	0.038	0.050	0.062
9	NRCS Runoff	P4 - Area to WQB		0.080		0.217	0.355	0.567	0.745	0.931
10	Junction	Post Surface Flow to LP		2.314		3.234	4.024	5.128	5.995	6.870
11	Junction	Post System Flow to LP		3.747		5.113	6.249	7.792	8.983	10.17

Hydrograph 2-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	3.002	12.08	9,274	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.176	12.08	548	----		
3	Junction	Pre Ex to Walbridg LP	3.177	12.08	9,823	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	1.485	12.07	4,773	----		
5	NRCS Runoff	P2 - Upper walkways	0.202	12.08	625	----		
6	NRCS Runoff	P2 - Parking Lot	2.056	12.07	7,119	----		
7	Junction	Sum - Walbr at Birch	2.257	12.07	7,744	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.006	12.10	25.5	----		
9	NRCS Runoff	P4 - Area to WQB	0.080	12.17	411	----		
10	Junction	Post Surface Flow to LP	2.314	12.07	8,180	7, 8, 9		
11	Junction	Post System Flow to LP	3.747	12.07	12,543	4, 7, 8		

Hydrograph 5-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	4.759	12.08	14,667	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.290	12.08	893	----		
3	Junction	Pre Ex to Walbridg LP	5.049	12.08	15,560	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	2.053	12.07	6,727	----		
5	NRCS Runoff	P2 - Upper walkways	0.295	12.07	926	----		
6	NRCS Runoff	P2 - Parking Lot	2.750	12.07	9,642	----		
7	Junction	Sum - Walbr at Birch	3.045	12.07	10,568	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.015	12.08	52.4	----		
9	NRCS Runoff	P4 - Area to WQB	0.217	12.13	861	----		
10	Junction	Post Surface Flow to LP	3.234	12.07	11,482	7, 8, 9		
11	Junction	Post System Flow to LP	5.113	12.07	17,347	4, 7, 8		

Hydrograph 10-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	6.274	12.08	19,421	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.390	12.08	1,202	----		
3	Junction	Pre Ex to Walbridg LP	6.664	12.08	20,623	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	2.524	12.07	8,372	----		
5	NRCS Runoff	P2 - Upper walkways	0.373	12.07	1,184	----		
6	NRCS Runoff	P2 - Parking Lot	3.328	12.07	11,750	----		
7	Junction	Sum - Walbr at Birch	3.701	12.07	12,935	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.024	12.08	79.2	----		
9	NRCS Runoff	P4 - Area to WQB	0.355	12.13	1,313	----		
10	Junction	Post Surface Flow to LP	4.024	12.08	14,327	7, 8, 9		
11	Junction	Post System Flow to LP	6.249	12.07	21,386	4, 7, 8		

Hydrograph 25-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	8.365	12.08	26,126	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.529	12.08	1,640	----		
3	Junction	Pre Ex to Walbridg LP	8.894	12.08	27,766	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	3.161	12.07	10,625	----		
5	NRCS Runoff	P2 - Upper walkways	0.479	12.07	1,541	----		
6	NRCS Runoff	P2 - Parking Lot	4.114	12.07	14,625	----		
7	Junction	Sum - Walbr at Birch	4.594	12.07	16,166	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.038	12.08	120	----		
9	NRCS Runoff	P4 - Area to WQB	0.567	12.12	2,009	----		
10	Junction	Post Surface Flow to LP	5.128	12.08	18,295	7, 8, 9		
11	Junction	Post System Flow to LP	7.792	12.07	26,912	4, 7, 8		

Hydrograph 50-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	10.00	12.07	31,436	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.639	12.08	1,990	----		
3	Junction	Pre Ex to Walbridg LP	10.64	12.07	33,426	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	3.651	12.07	12,375	----		
5	NRCS Runoff	P2 - Upper walkways	0.561	12.07	1,821	----		
6	NRCS Runoff	P2 - Parking Lot	4.722	12.07	16,851	----		
7	Junction	Sum - Walbr at Birch	5.283	12.07	18,672	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.050	12.08	154	----		
9	NRCS Runoff	P4 - Area to WQB	0.745	12.12	2,595	----		
10	Junction	Post Surface Flow to LP	5.995	12.08	21,422	7, 8, 9		
11	Junction	Post System Flow to LP	8.983	12.07	31,202	4, 7, 8		

Hydrograph 100-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	11.64	12.07	36,819	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.749	12.07	2,347	----		
3	Junction	Pre Ex to Walbridg LP	12.39	12.07	39,165	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	4.140	12.07	14,128	----		
5	NRCS Runoff	P2 - Upper walkways	0.643	12.07	2,102	----		
6	NRCS Runoff	P2 - Parking Lot	5.329	12.07	19,078	----		
7	Junction	Sum - Walbr at Birch	5.972	12.07	21,180	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.062	12.08	191	----		
9	NRCS Runoff	P4 - Area to WQB	0.931	12.12	3,213	----		
10	Junction	Post Surface Flow to LP	6.870	12.08	24,584	7, 8, 9		
11	Junction	Post System Flow to LP	10.17	12.07	35,498	4, 7, 8		

IDF Report

IDF filename: Farmington.idf

Hydrology Studio v 1.0.0.0

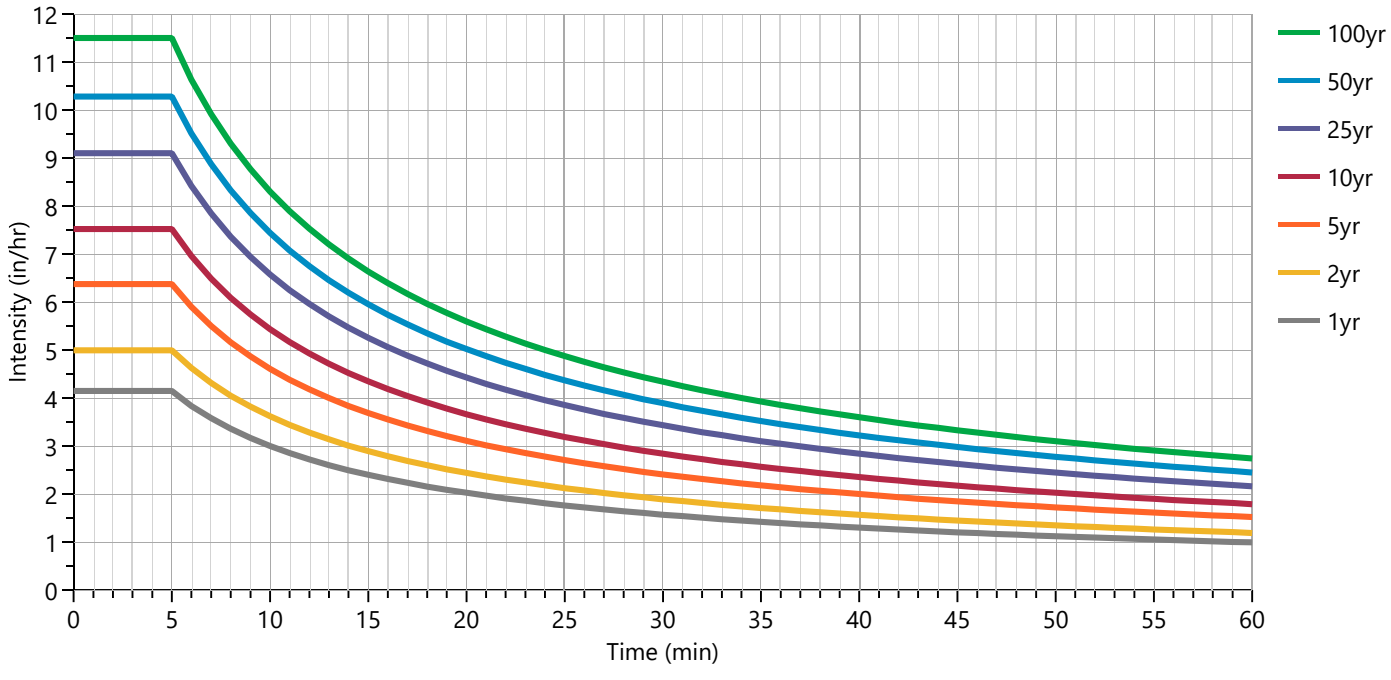
03-19-2020

Equation Coefficients	Intensity = B / (Tc + D)^E (in/hr)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
B	20.2576	24.9217	0.0000	31.2346	36.9453	44.8352	51.2074	55.5061	
D	3.9000	4.0000	0.0000	3.9000	3.9000	3.9000	4.0000	3.8000	
E	0.7258	0.7314	0.0000	0.7271	0.7282	0.7295	0.7309	0.7239	

Minimum Tc = 5 minutes

Tc (min)	Intensity Values (in/hr)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
Cf	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
5	4.14	5.00	0	6.37	7.52	9.10	10.28	11.50	
10	3.00	3.62	0	4.61	5.44	6.57	7.44	8.30	
15	2.40	2.89	0	3.69	4.35	5.25	5.95	6.64	
20	2.02	2.44	0	3.11	3.66	4.43	5.02	5.59	
25	1.76	2.12	0	2.71	3.19	3.85	4.37	4.87	
30	1.57	1.89	0	2.41	2.84	3.43	3.89	4.34	
35	1.42	1.71	0	2.18	2.57	3.10	3.52	3.93	
40	1.30	1.57	0	2.00	2.35	2.84	3.22	3.60	
45	1.20	1.45	0	1.85	2.18	2.63	2.98	3.33	
50	1.12	1.35	0	1.72	2.03	2.45	2.77	3.10	
55	1.05	1.26	0	1.61	1.90	2.29	2.60	2.91	
60	0.99	1.19	0	1.52	1.79	2.16	2.45	2.74	

Cf = Correction Factor applied to Rational Method runoff coefficient.



Precipitation Report

Precipitation filename: West Hartford.pcp

Hydrology Studio v 1.0.0.0

03-19-2020

	Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Active			✔		✔	✔	✔	✔	✔
SCS Storms	**> SCS Dimensionless Storms**								
SCS 6hr		1.83	2.23	0	2.87	3.40	4.13	4.69	5.25
Type I, 24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Type IA, 24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Type II, 24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Type II FL, 24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Type III, 24-hr	✔	2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Synthetic Storms	**> IDF-Based Synthetic Storms**								
1-hr		0.99	1.19	0	1.52	1.79	2.16	2.45	2.74
2-hr		1.23	1.47	0	1.88	2.21	2.66	3.02	3.39
3-hr		1.38	1.65	0	2.11	2.49	3.00	3.40	3.82
6-hr		1.68	2.00	0	2.57	3.03	3.64	4.13	4.66
12-hr		2.04	2.42	0	3.12	3.67	4.41	4.99	5.67
24-hr		2.47	2.92	0	3.78	4.44	5.33	6.03	6.87
Huff Distribution	**> 1st Quartile (0 to 6 hrs)**								
1-hr		0.98	1.18	0	1.51	1.78	2.16	2.46	2.75
2-hr		1.26	1.52	0	1.94	2.29	2.77	3.14	3.51
3-hr		1.45	1.75	0	2.24	2.65	3.21	3.64	4.07
6-hr		1.83	2.23	0	2.87	3.40	4.13	4.69	5.25
Huff Distribution	**> 2nd Quartile (>6 to 12 hrs)**								
8-hr		0	0	0	0	0	0	0	0
12-hr		2.26	2.77	0	3.62	4.32	5.28	6.02	6.77
Huff Distribution	**> 3rd Quartile (>12 to 24 hrs)**								
18-hr		0	0	0	0	0	0	0	0
24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Custom Storms	**> Custom Storm Distributions**								
My Custom Storm 1		0	0	0	0	0	0	0	0
My Custom Storm 2		0	0	0	0	0	0	0	0
My Custom Storm 3		0	0	0	0	0	0	0	0
My Custom Storm 4		0	0	0	0	0	0	0	0
My Custom Storm 5		0	0	0	0	0	0	0	0
My Custom Storm 6		0	0	0	0	0	0	0	0
My Custom Storm 7		0	0	0	0	0	0	0	0
My Custom Storm 8		0	0	0	0	0	0	0	0
My Custom Storm 9		0	0	0	0	0	0	0	0
My Custom Storm 10		0	0	0	0	0	0	0	0

Precipitation Report Cont'd

	Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Active			✔		✔	✔	✔	✔	✔
Huff Indiana	**> Indianapolis**								
30-min		0	0	0	0	0	0	0	0
1-hr		0	0	0	0	0	0	0	0
2-hr		0	0	0	0	0	0	0	0
3-hr		0	0	0	0	0	0	0	0
6-hr		0	0	0	0	0	0	0	0
12-hr		0	0	0	0	0	0	0	0
24-hr		0	0	0	0	0	0	0	0
Huff Indiana	**> Evansville**								
30-min		0	0	0	0	0	0	0	0
1-hr		0	0	0	0	0	0	0	0
2-hr		0	0	0	0	0	0	0	0
3-hr		0	0	0	0	0	0	0	0
6-hr		0	0	0	0	0	0	0	0
12-hr		0	0	0	0	0	0	0	0
24-hr		0	0	0	0	0	0	0	0
Huff Indiana	**> Fort Wayne**								
30-min		0	0	0	0	0	0	0	0
1-hr		0	0	0	0	0	0	0	0
2-hr		0	0	0	0	0	0	0	0
3-hr		0	0	0	0	0	0	0	0
6-hr		0	0	0	0	0	0	0	0
12-hr		0	0	0	0	0	0	0	0
24-hr		0	0	0	0	0	0	0	0
Huff Indiana	**> South Bend**								
30-min		0	0	0	0	0	0	0	0
1-hr		0	0	0	0	0	0	0	0
2-hr		0	0	0	0	0	0	0	0
3-hr		0	0	0	0	0	0	0	0
6-hr		0	0	0	0	0	0	0	0
12-hr		0	0	0	0	0	0	0	0
24-hr		0	0	0	0	0	0	0	0
NRCS Storms	**> NRCS Dimensionless Storms**								
NRCS MSE3, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE4, 24-hr		0	0	0	0	0	0	0	0

Appendix B

Hydrology Studio – Full Report

Table of Contents

Contents continued...

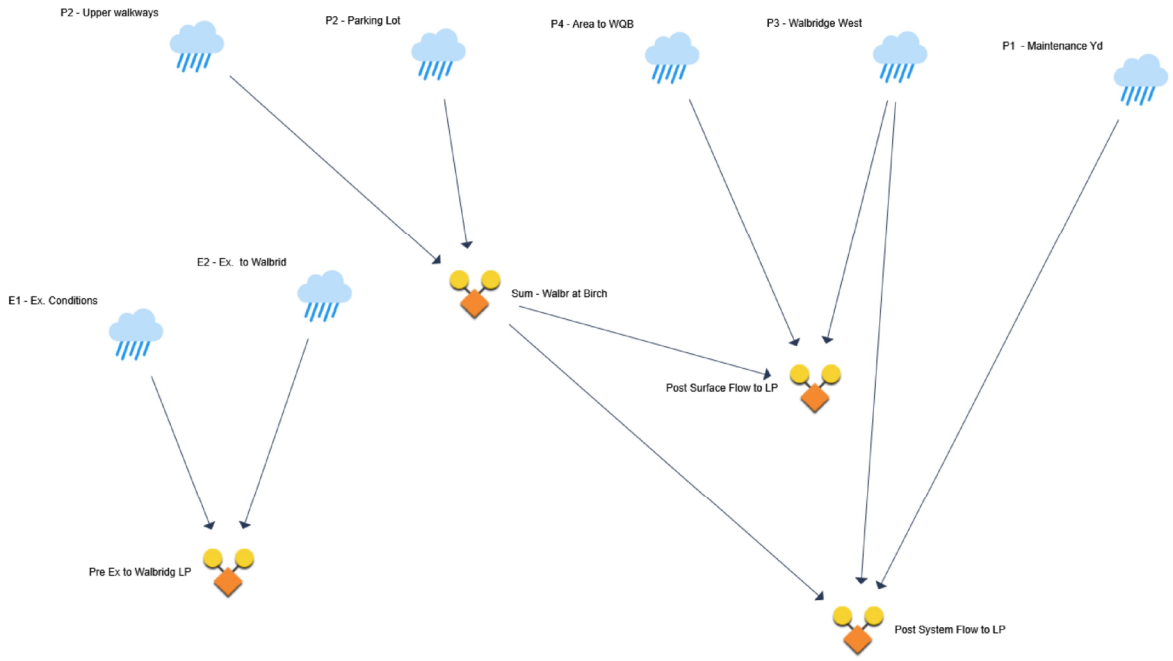
Contents continued...

Basin Model

Hydrology Studio v 1.0.0.0

Project Name: Elizabeth Park Parking

03-19-2020



Hydrograph by Return Period

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	NRCS Runoff	E1 - Ex. Conditions		3.002		4.759	6.274	8.365	10.00	11.64
2	NRCS Runoff	E2 - Ex. to Walbrid		0.176		0.290	0.390	0.529	0.639	0.749
3	Junction	Pre Ex to Walbridg LP		3.177		5.049	6.664	8.894	10.64	12.39
4	NRCS Runoff	P1 - Maintenance Yd		1.485		2.053	2.524	3.161	3.651	4.140
5	NRCS Runoff	P2 - Upper walkways		0.202		0.295	0.373	0.479	0.561	0.643
6	NRCS Runoff	P2 - Parking Lot		2.056		2.750	3.328	4.114	4.722	5.329
7	Junction	Sum - Walbr at Birch		2.257		3.045	3.701	4.594	5.283	5.972
8	NRCS Runoff	P3 - Walbridge West		0.006		0.015	0.024	0.038	0.050	0.062
9	NRCS Runoff	P4 - Area to WQB		0.080		0.217	0.355	0.567	0.745	0.931
10	Junction	Post Surface Flow to LP		2.314		3.234	4.024	5.128	5.995	6.870
11	Junction	Post System Flow to LP		3.747		5.113	6.249	7.792	8.983	10.17

Hydrograph 2-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	3.002	12.08	9,274	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.176	12.08	548	----		
3	Junction	Pre Ex to Walbridg LP	3.177	12.08	9,823	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	1.485	12.07	4,773	----		
5	NRCS Runoff	P2 - Upper walkways	0.202	12.08	625	----		
6	NRCS Runoff	P2 - Parking Lot	2.056	12.07	7,119	----		
7	Junction	Sum - Walbr at Birch	2.257	12.07	7,744	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.006	12.10	25.5	----		
9	NRCS Runoff	P4 - Area to WQB	0.080	12.17	411	----		
10	Junction	Post Surface Flow to LP	2.314	12.07	8,180	7, 8, 9		
11	Junction	Post System Flow to LP	3.747	12.07	12,543	4, 7, 8		

Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

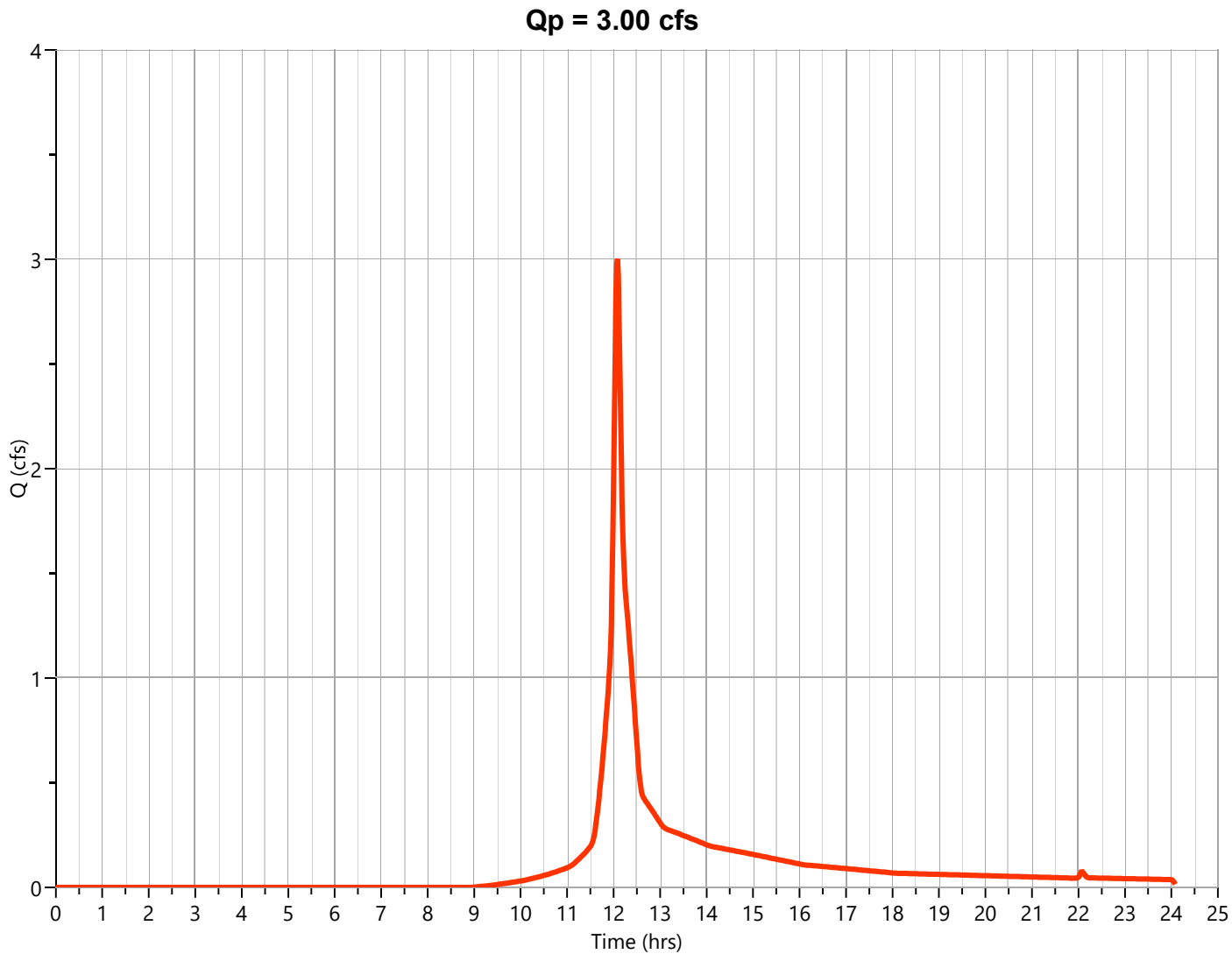
E1 - Ex. Conditions

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.002 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 9,274 cuft
Drainage Area	= 1.586 ac	Curve Number	= 81.2*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.257	98	Paved E1B, C, D
0.709	89	Millings E1A
0.579	63	Grass/Mulch E1F, G, H, J, K
0.041	98	Maint. Bldg. Roof E1E
1.586	**81**	Weighted CN Method Employed



Hydrograph Report

Hydrology Studio v 1.0.0.0

03-19-2020

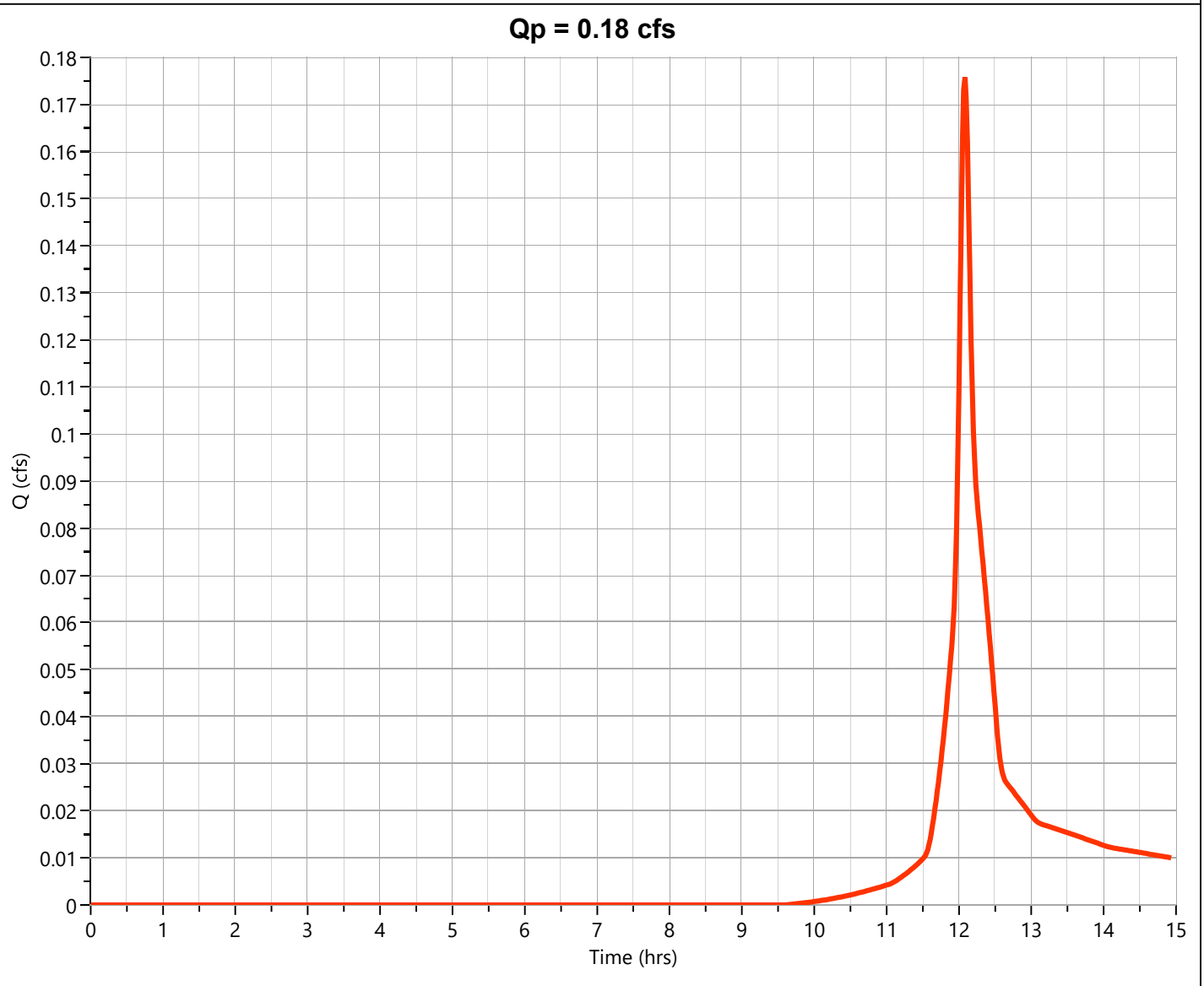
E2 - Ex. to Walbrid

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.176 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 548 cuft
Drainage Area	= 0.107 ac	Curve Number	= 78.34*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.034	89	Millings E2A
0.011	98	Pavement E2B
0.062	69	Grass/Mulch E2C
0.107	**78**	Weighted CN Method Employed



Hydrograph Report

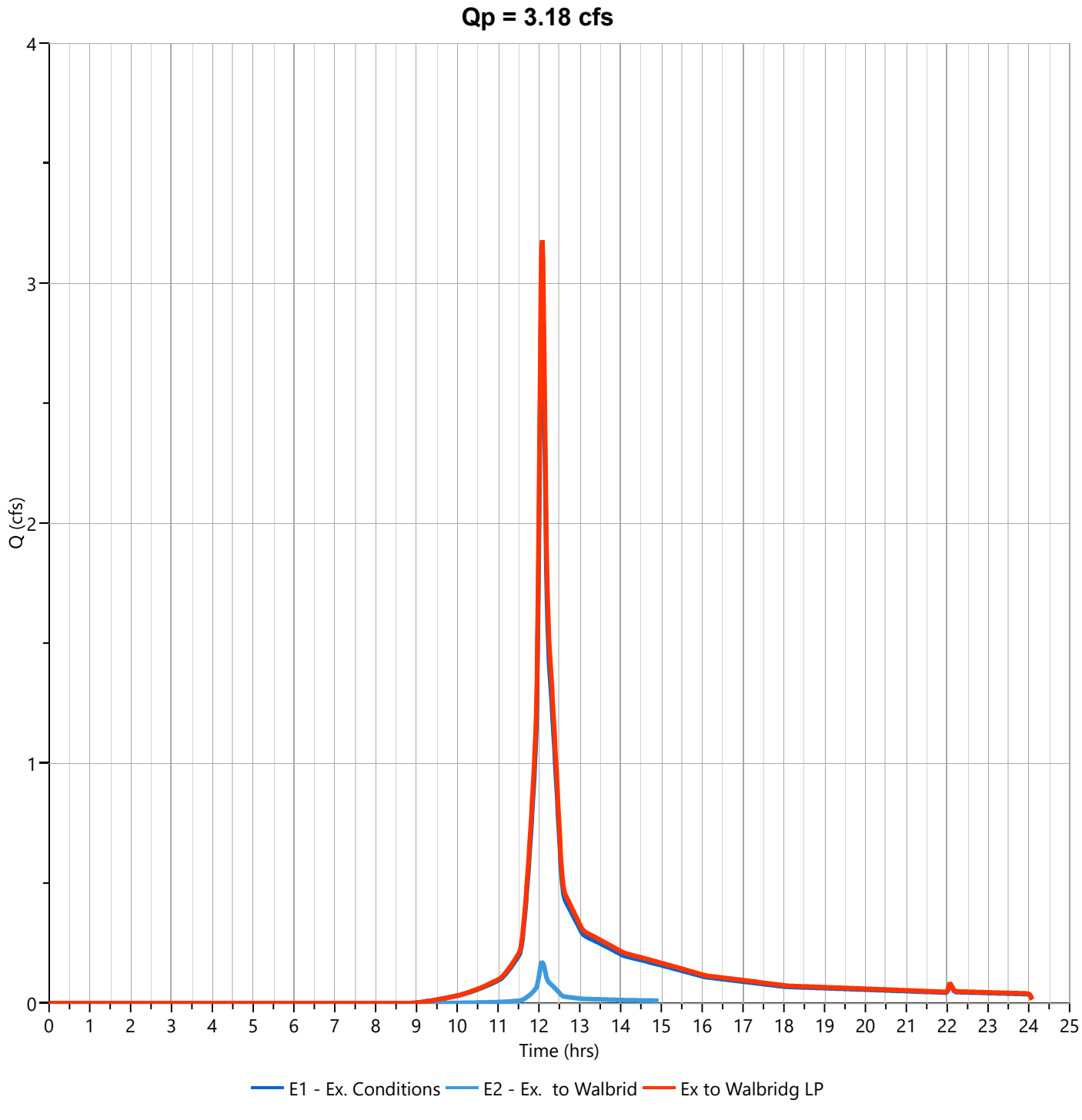
Hydrology Studio v 1.0.0.0

03-19-2020

Pre Ex to Walbridg LP

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 3.177 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,823 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 1.693 ac



Hydrograph Report

Hydrology Studio v 1.0.0.0

03-19-2020

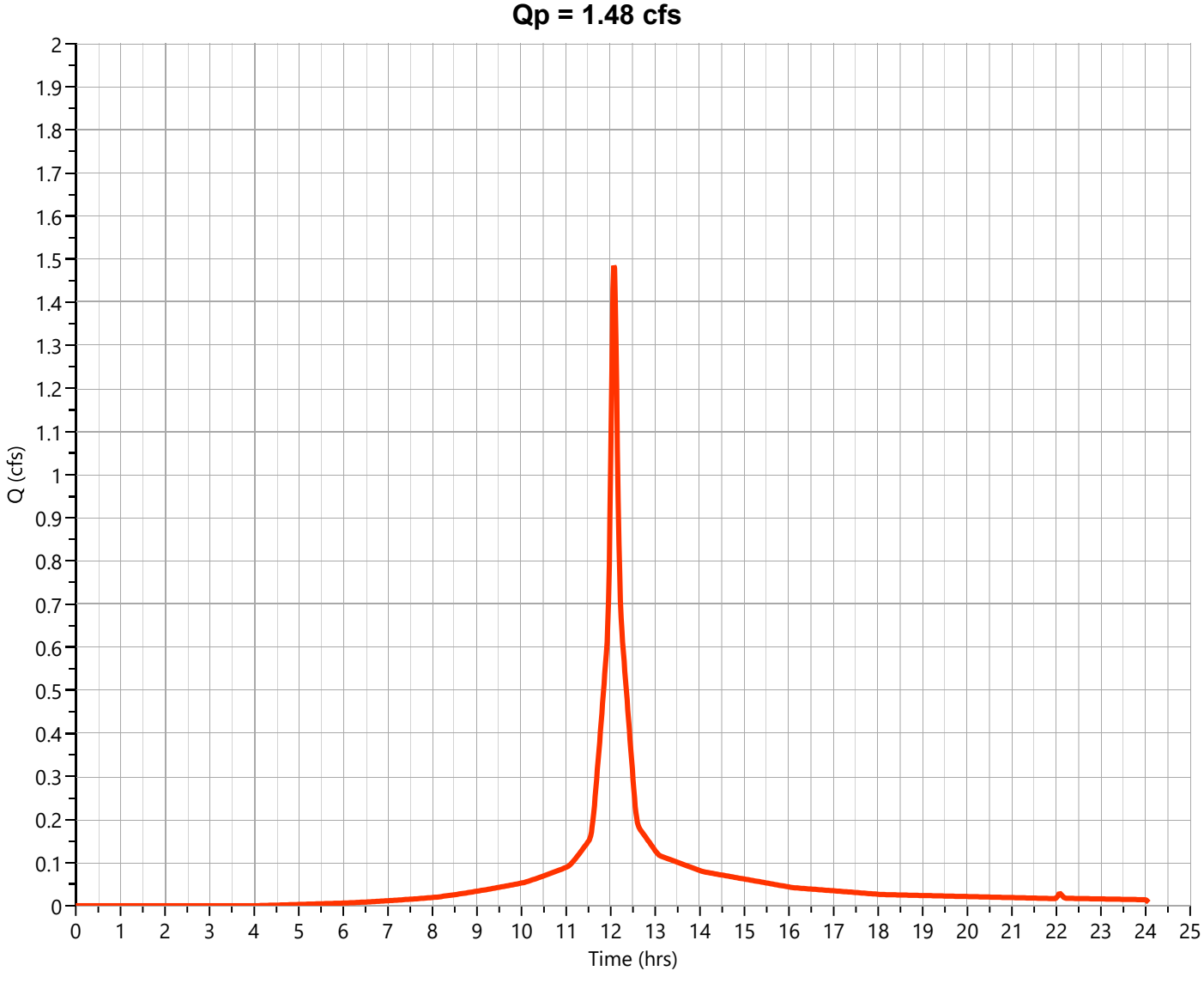
P1 - Maintenance Yd

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.485 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 4,773 cuft
Drainage Area	= 0.491 ac	Curve Number	= 93.56*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.43	98	P1A - Paved/Maint Bldg Roof
0.036	61	P1B - Grass
0.025	64	P1C - Landscaped Berm
0.491	**94**	Weighted CN Method Employed



Hydrograph Report

Hydrology Studio v 1.0.0.0

03-19-2020

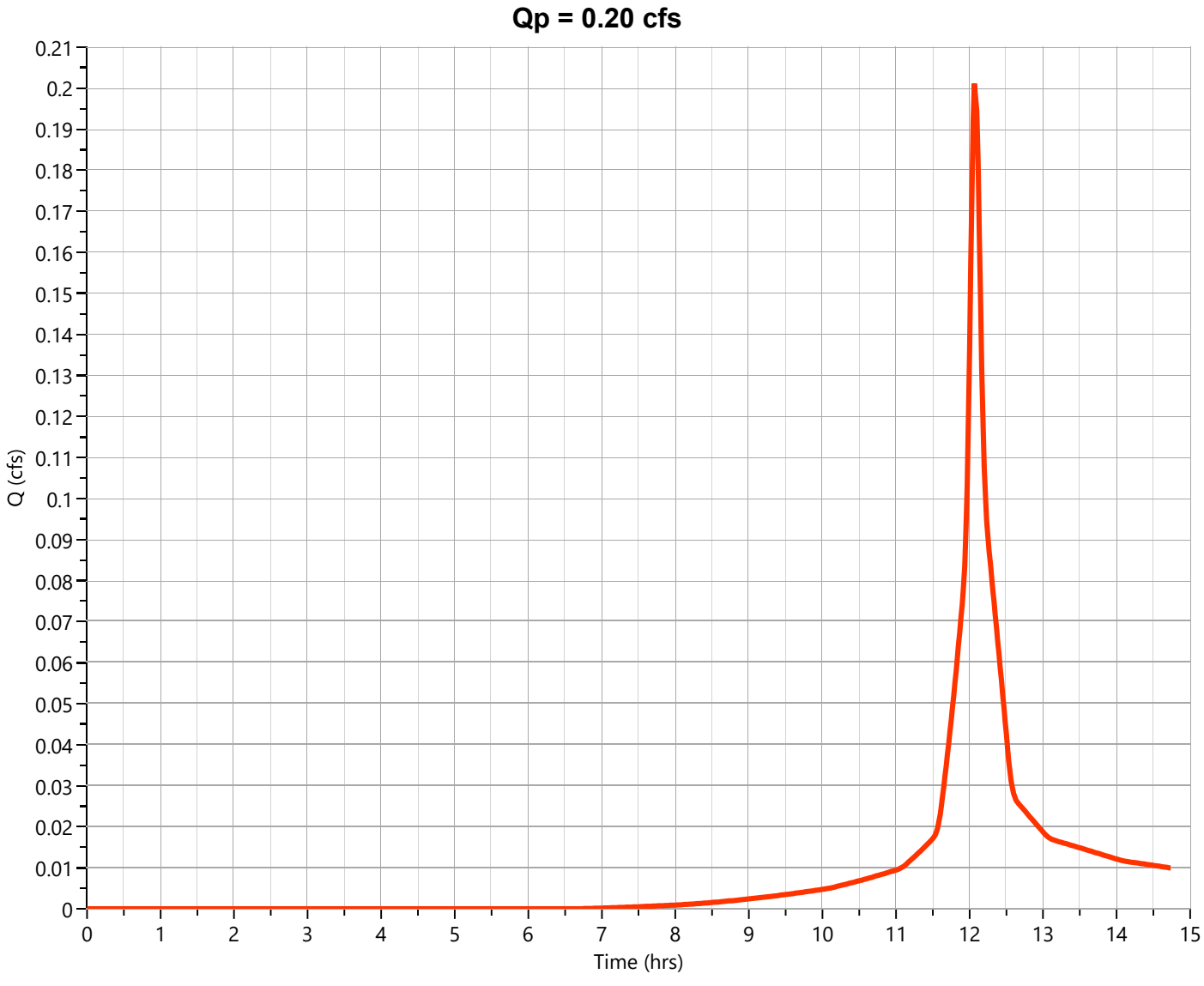
P2 - Upper walkways

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.202 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 625 cuft
Drainage Area	= 0.08 ac	Curve Number	= 88*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.065	62	P2C Grass
0.129	61	P2D, E, F, G, H Grass
0.12	64	P2J Grass/Mulch
0.08	**88**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

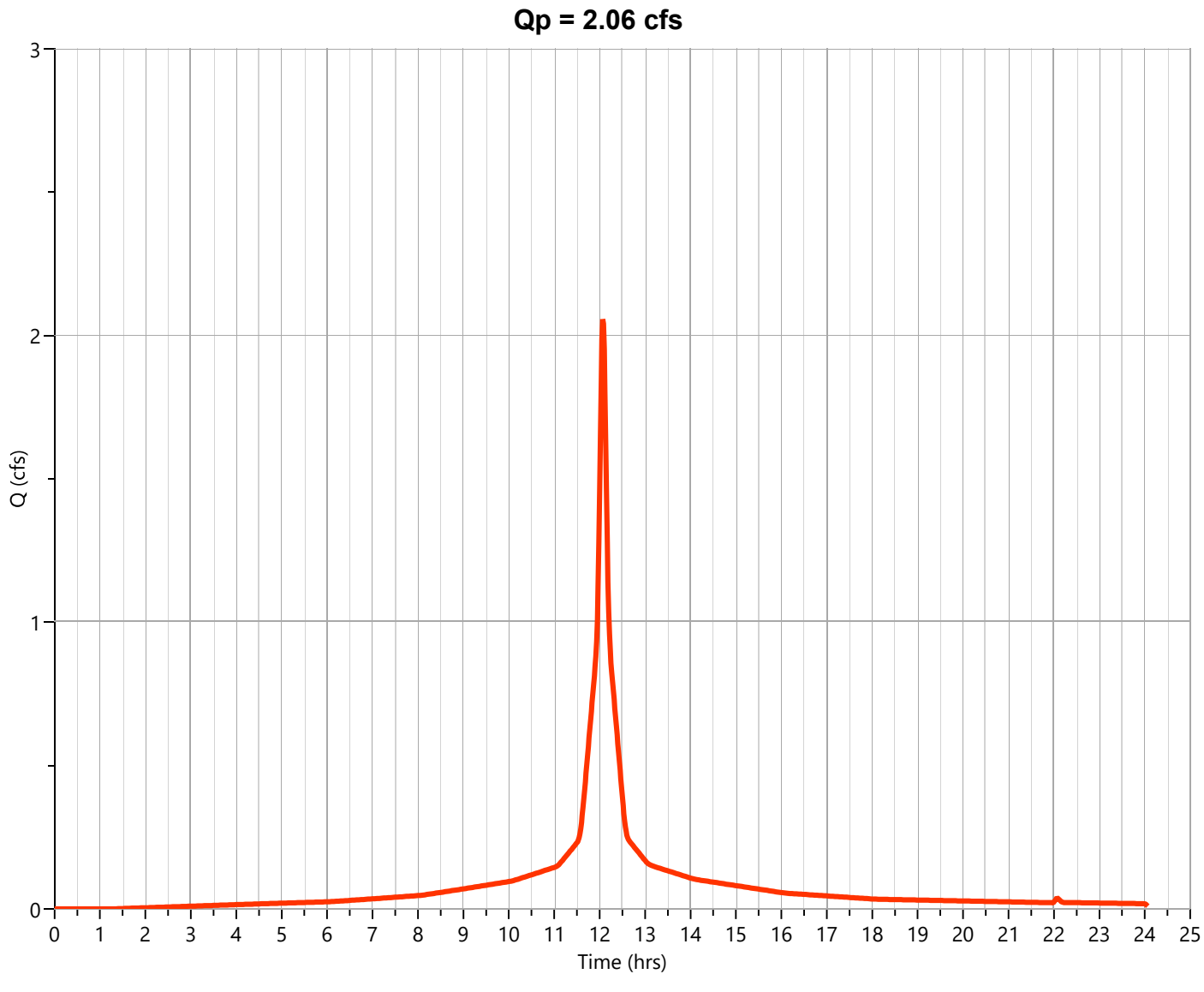
P2 - Parking Lot

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.056 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 7,119 cuft
Drainage Area	= 0.62 ac	Curve Number	= 98*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.537	98	P2A - Impervious
0.084	98	P2B - Impervious
0.62	**98**	Weighted CN Method Employed



Hydrograph Report

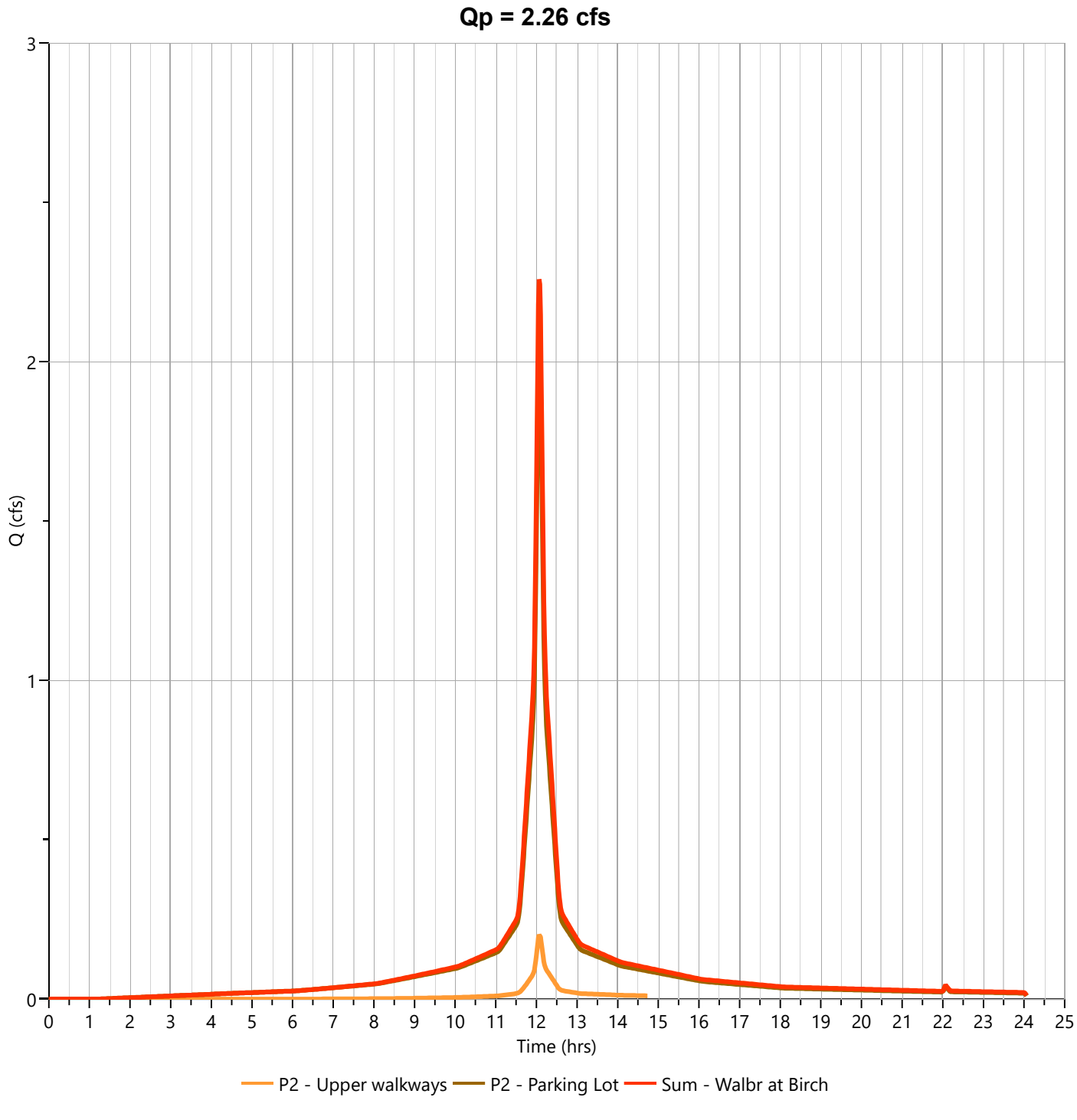
Hydrology Studio v 1.0.0.0

03-19-2020

Sum - Walbr at Birch

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 2.257 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,744 cuft
Inflow Hydrographs	= 5, 6	Total Contrib. Area	= 0.7 ac



Hydrograph Report

Hydrology Studio v 1.0.0.0

03-19-2020

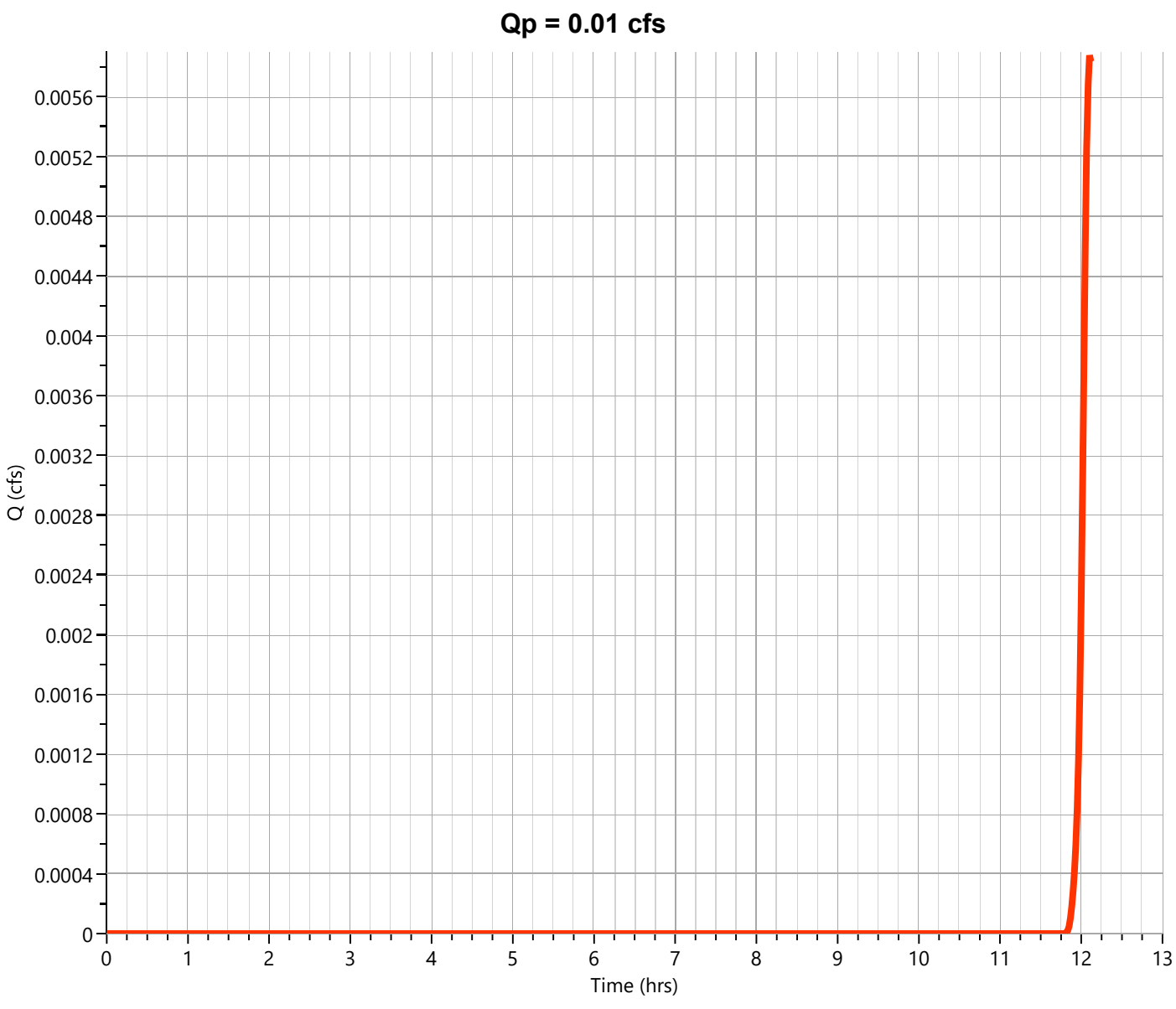
P3 - Walbridge West

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.006 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 25.5 cuft
Drainage Area	= 0.013 ac	Curve Number	= 62*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.013	62	P3A - Grass
0.013	**62**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

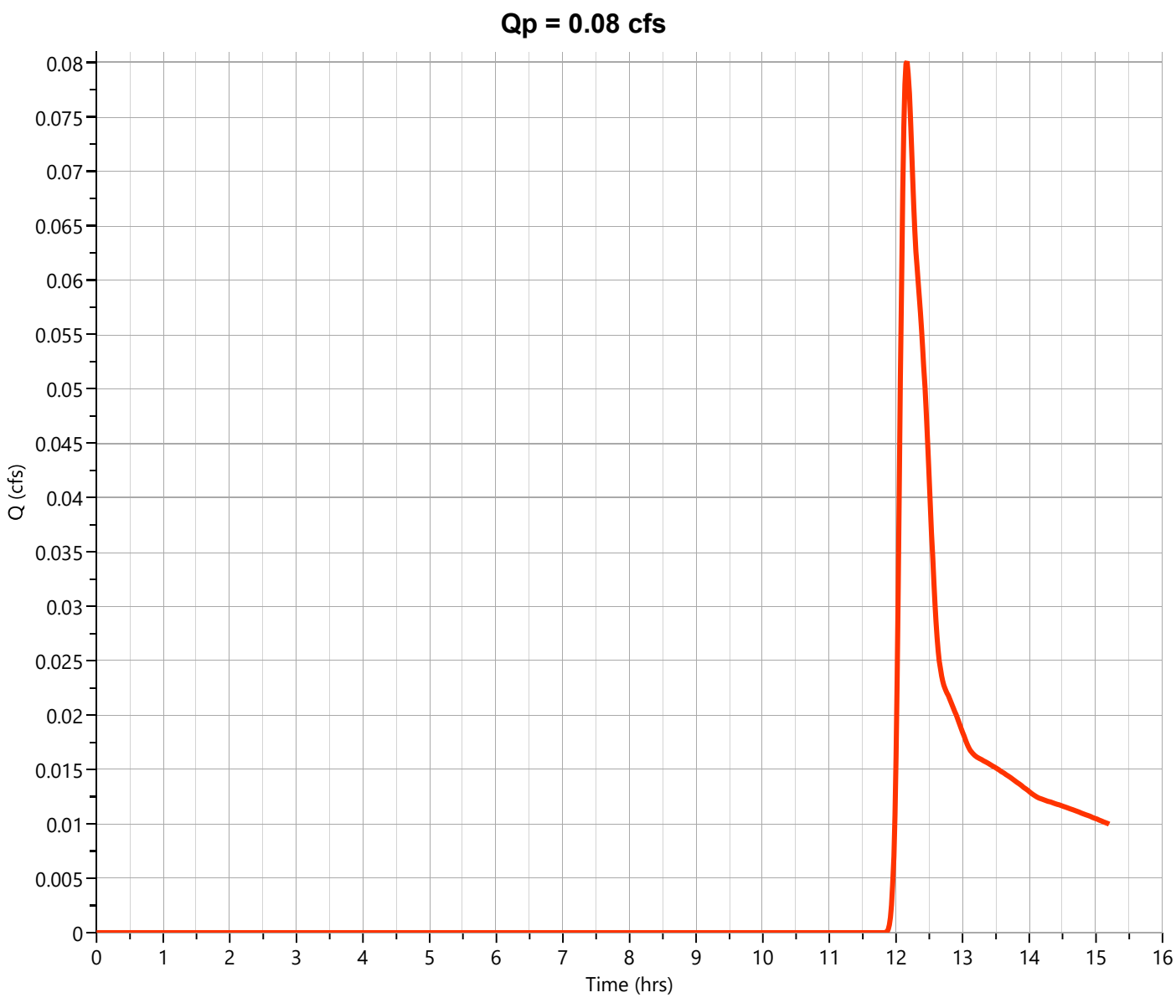
P4 - Area to WQB

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.080 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 411 cuft
Drainage Area	= 0.233 ac	Curve Number	= 61*
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 3.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.233	61	P4A - Pervious (grass/mulch)
0.233	**61**	Weighted CN Method Employed



Hydrograph Report

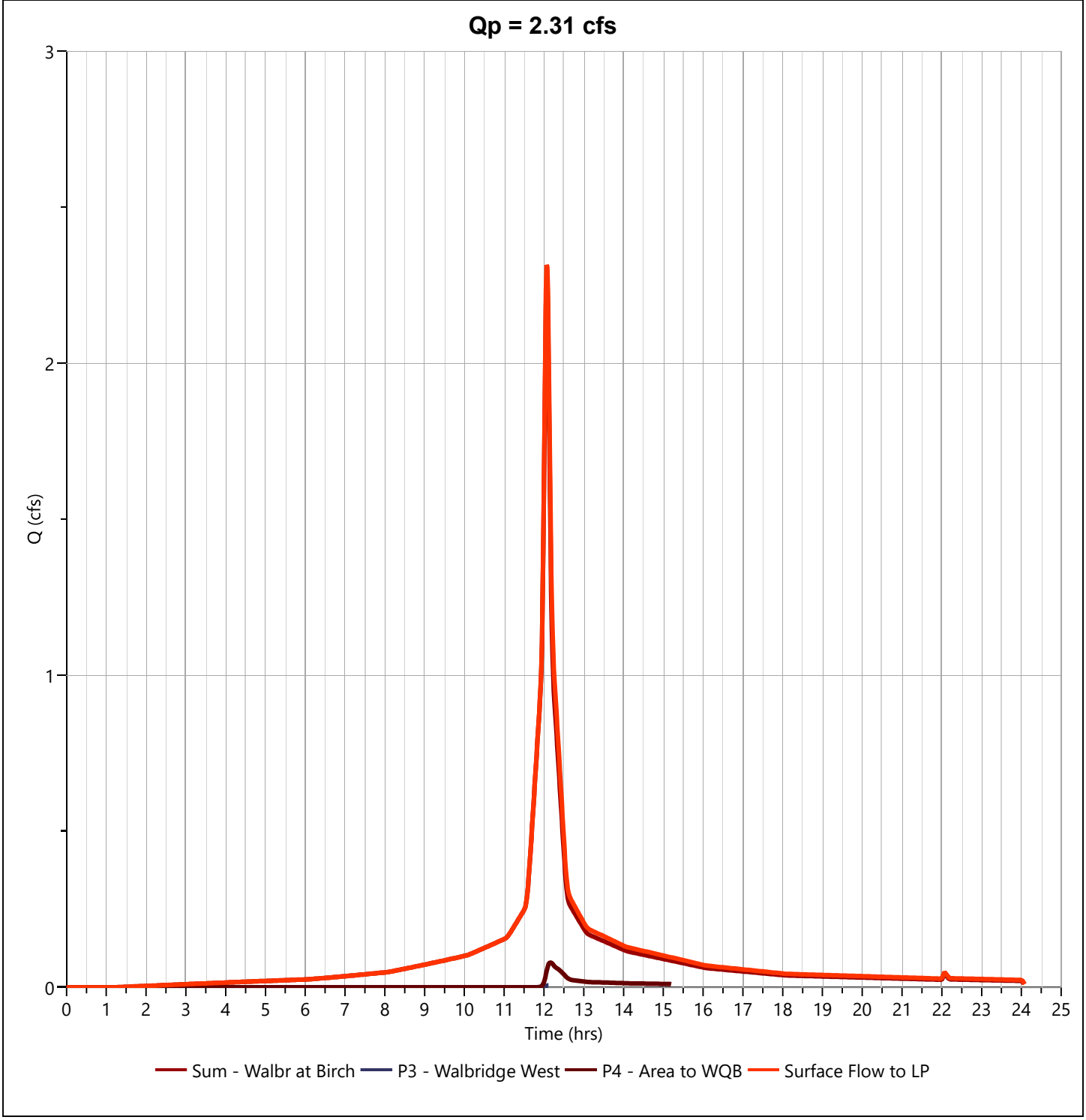
Hydrology Studio v 1.0.0.0

03-19-2020

Post Surface Flow to LP

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 2.314 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,180 cuft
Inflow Hydrographs	= 7, 8, 9	Total Contrib. Area	= 0.946 ac

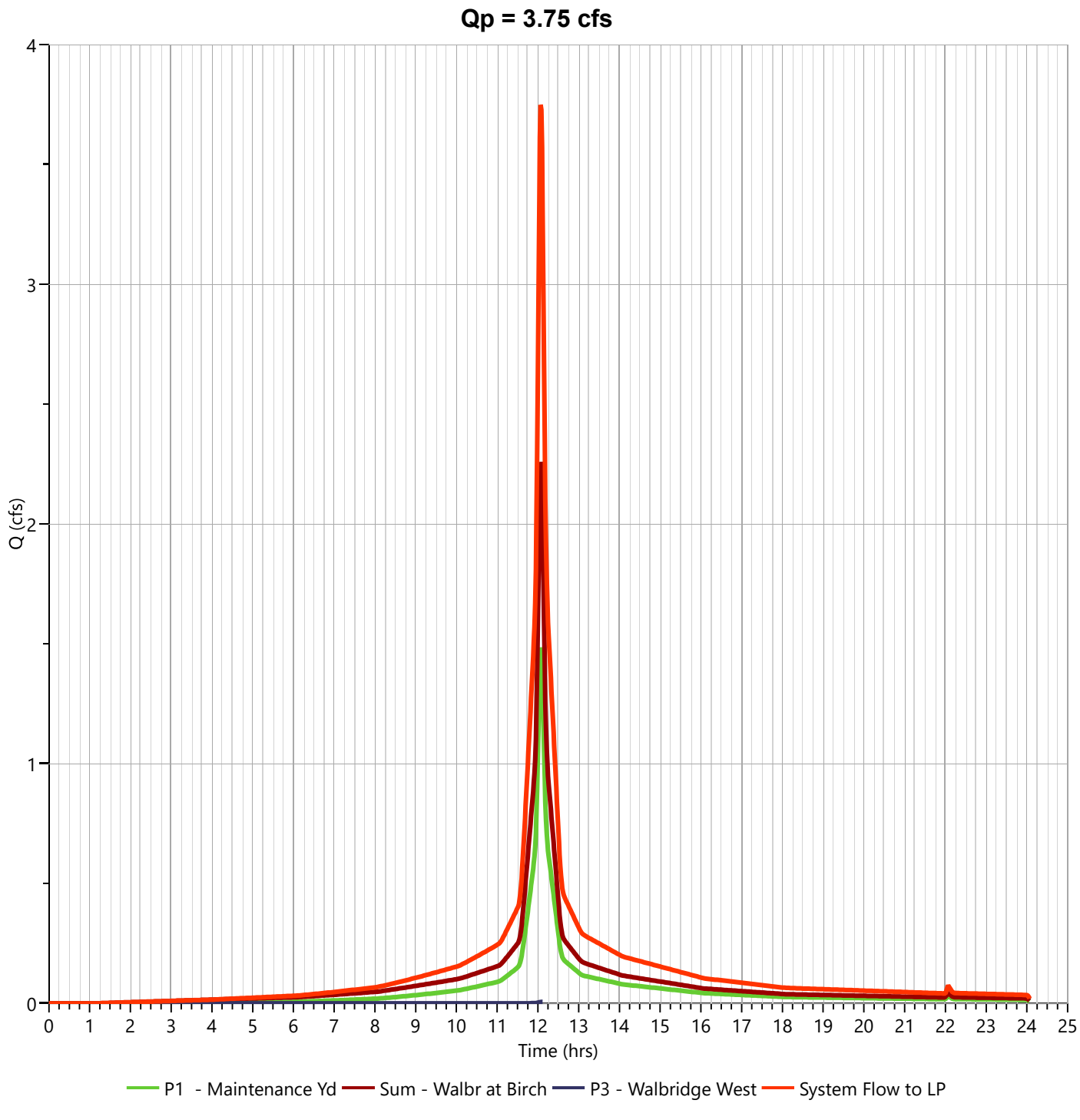


Hydrograph Report

Post System Flow to LP

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 3.747 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 12,543 cuft
Inflow Hydrographs	= 4, 7, 8	Total Contrib. Area	= 1.204 ac



Design Storm Report

Custom Storm filename: Bridgeport - 24 HR.cds

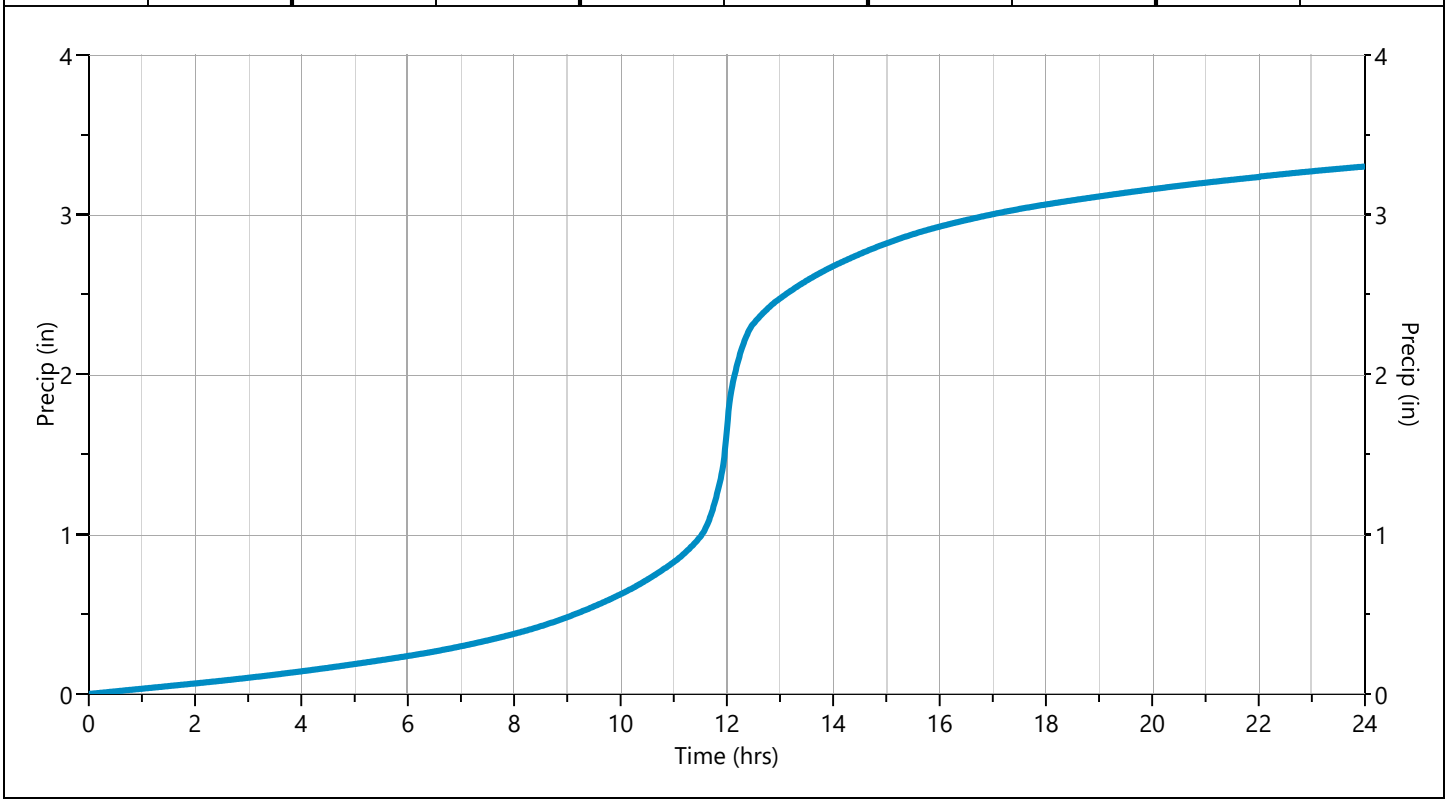
Hydrology Studio v 1.0.0.0

03-19-2020

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)								
	1-yr	✔ 2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
24 hrs	2.64	3.30	0.00	4.39	5.30	6.54	7.50	8.46	

Incremental Rainfall Distribution, 2-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.50	0.006503	11.68	0.015015	11.87	0.023888	12.05	0.049582	12.23	0.019855
11.52	0.006930	11.70	0.015822	11.88	0.024695	12.07	0.042817	12.25	0.019048
11.53	0.007755	11.72	0.016628	11.90	0.025502	12.08	0.036052	12.27	0.018242
11.55	0.008562	11.73	0.017435	11.92	0.029382	12.10	0.029287	12.28	0.017435
11.57	0.009368	11.75	0.018242	11.93	0.036053	12.12	0.025599	12.30	0.016629
11.58	0.010175	11.77	0.019048	11.95	0.042818	12.13	0.024695	12.32	0.015822
11.60	0.010982	11.78	0.019855	11.97	0.049583	12.15	0.023888	12.33	0.015015
11.62	0.011788	11.80	0.020662	11.98	0.056348	12.17	0.023082	12.35	0.014208
11.63	0.012595	11.82	0.021468	**12.00**	**0.063113**	12.18	0.022275	12.37	0.013402
11.65	0.013402	11.83	0.022275	12.02	0.062961	12.20	0.021468	12.38	0.012595
11.67	0.014208	11.85	0.023082	12.03	0.056347	12.22	0.020662	12.40	0.011788



Hydrograph 5-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	4.759	12.08	14,667	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.290	12.08	893	----		
3	Junction	Pre Ex to Walbridg LP	5.049	12.08	15,560	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	2.053	12.07	6,727	----		
5	NRCS Runoff	P2 - Upper walkways	0.295	12.07	926	----		
6	NRCS Runoff	P2 - Parking Lot	2.750	12.07	9,642	----		
7	Junction	Sum - Walbr at Birch	3.045	12.07	10,568	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.015	12.08	52.4	----		
9	NRCS Runoff	P4 - Area to WQB	0.217	12.13	861	----		
10	Junction	Post Surface Flow to LP	3.234	12.07	11,482	7, 8, 9		
11	Junction	Post System Flow to LP	5.113	12.07	17,347	4, 7, 8		

Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

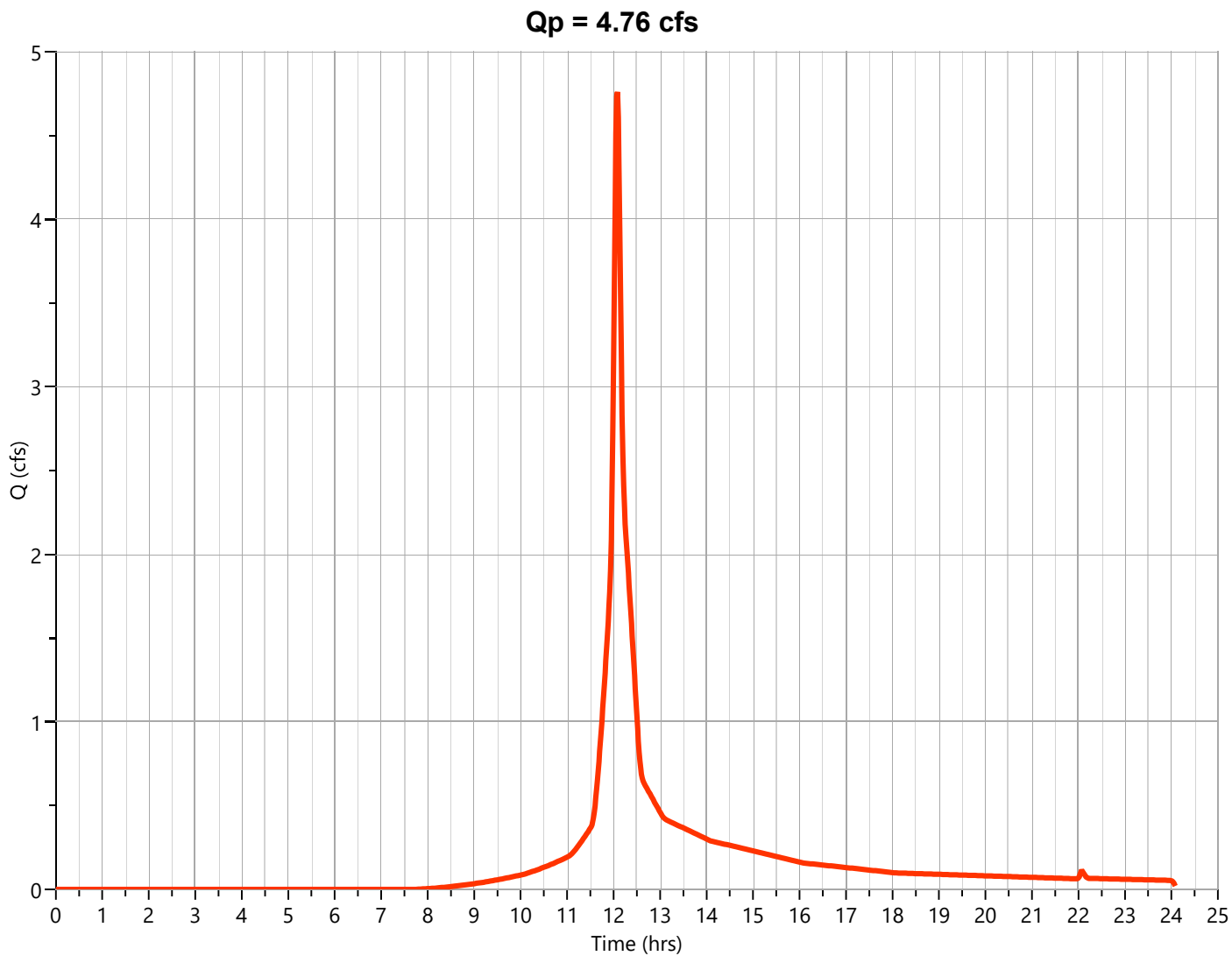
E1 - Ex. Conditions

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.759 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 14,667 cuft
Drainage Area	= 1.586 ac	Curve Number	= 81.2*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.39 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.257	98	Paved E1B, C, D
0.709	89	Millings E1A
0.579	63	Grass/Mulch E1F, G, H, J, K
0.041	98	Maint. Bldg. Roof E1E
1.586	**81**	Weighted CN Method Employed



Hydrograph Report

Hydrology Studio v 1.0.0.0

03-19-2020

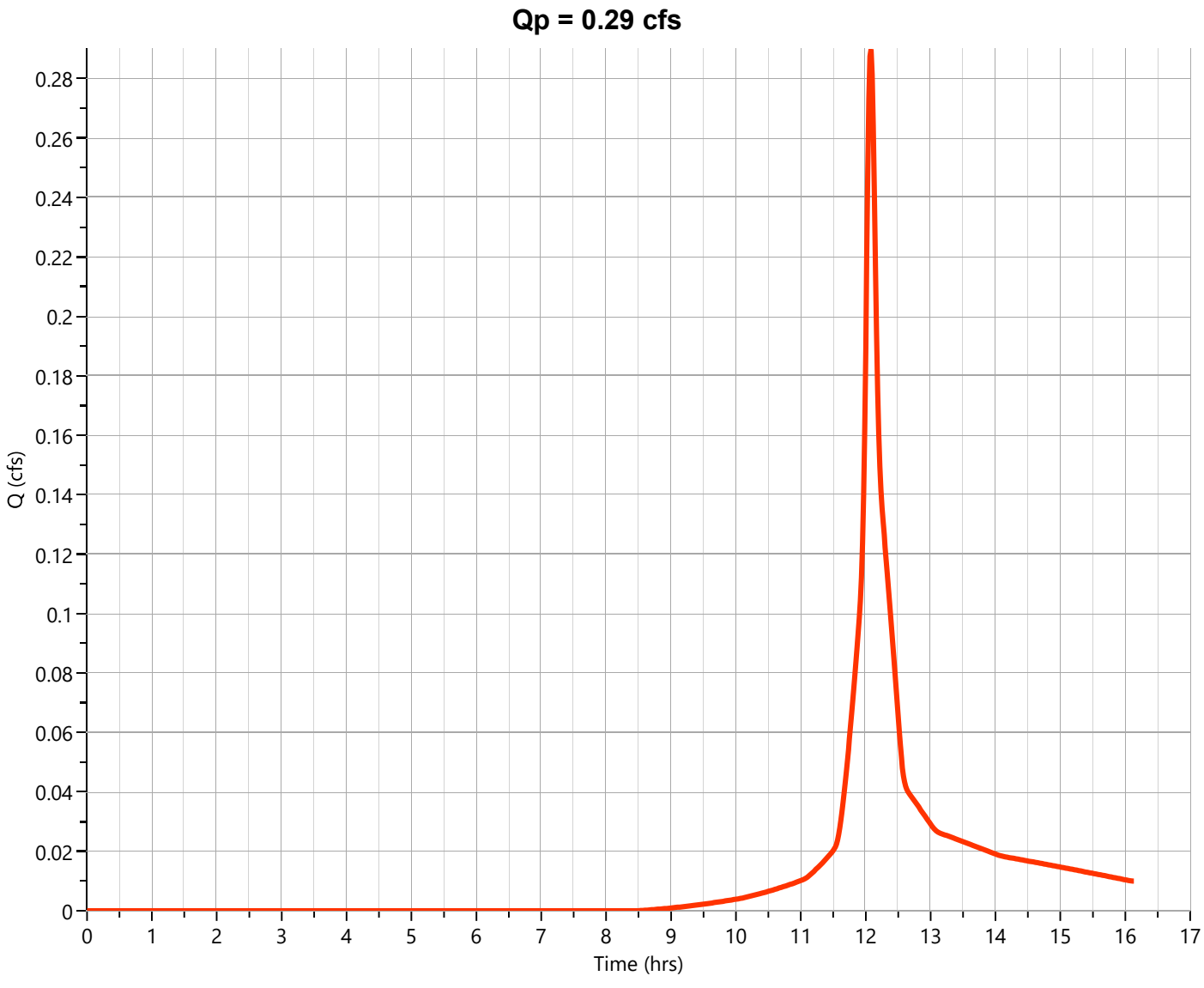
E2 - Ex. to Walbrid

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.290 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 893 cuft
Drainage Area	= 0.107 ac	Curve Number	= 78.34*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.39 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.034	89	Millings E2A
0.011	98	Pavement E2B
0.062	69	Grass/Mulch E2C
0.107	**78**	Weighted CN Method Employed



Hydrograph Report

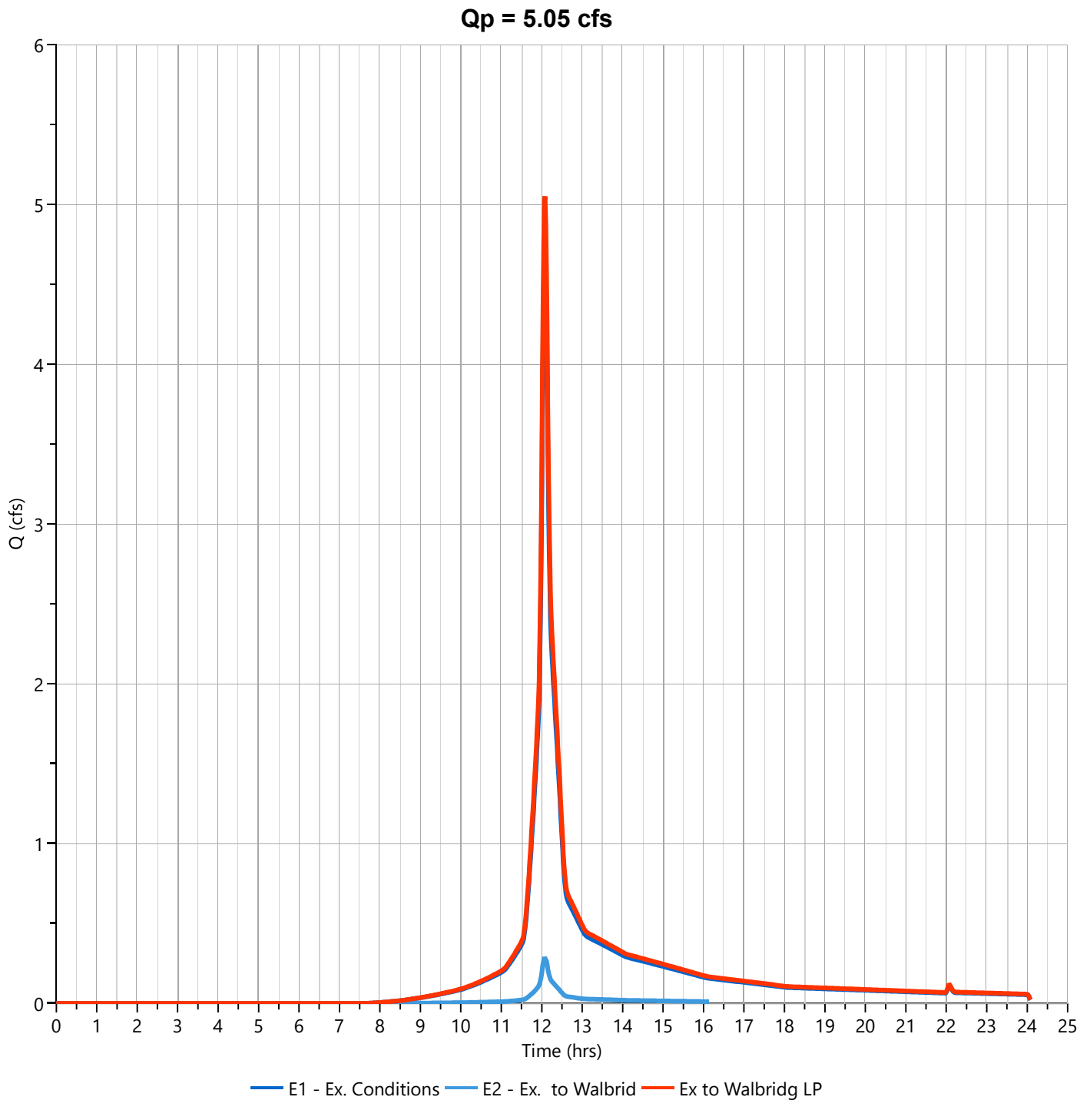
Hydrology Studio v 1.0.0.0

03-19-2020

Pre Ex to Walbridg LP

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 5.049 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,560 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 1.693 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

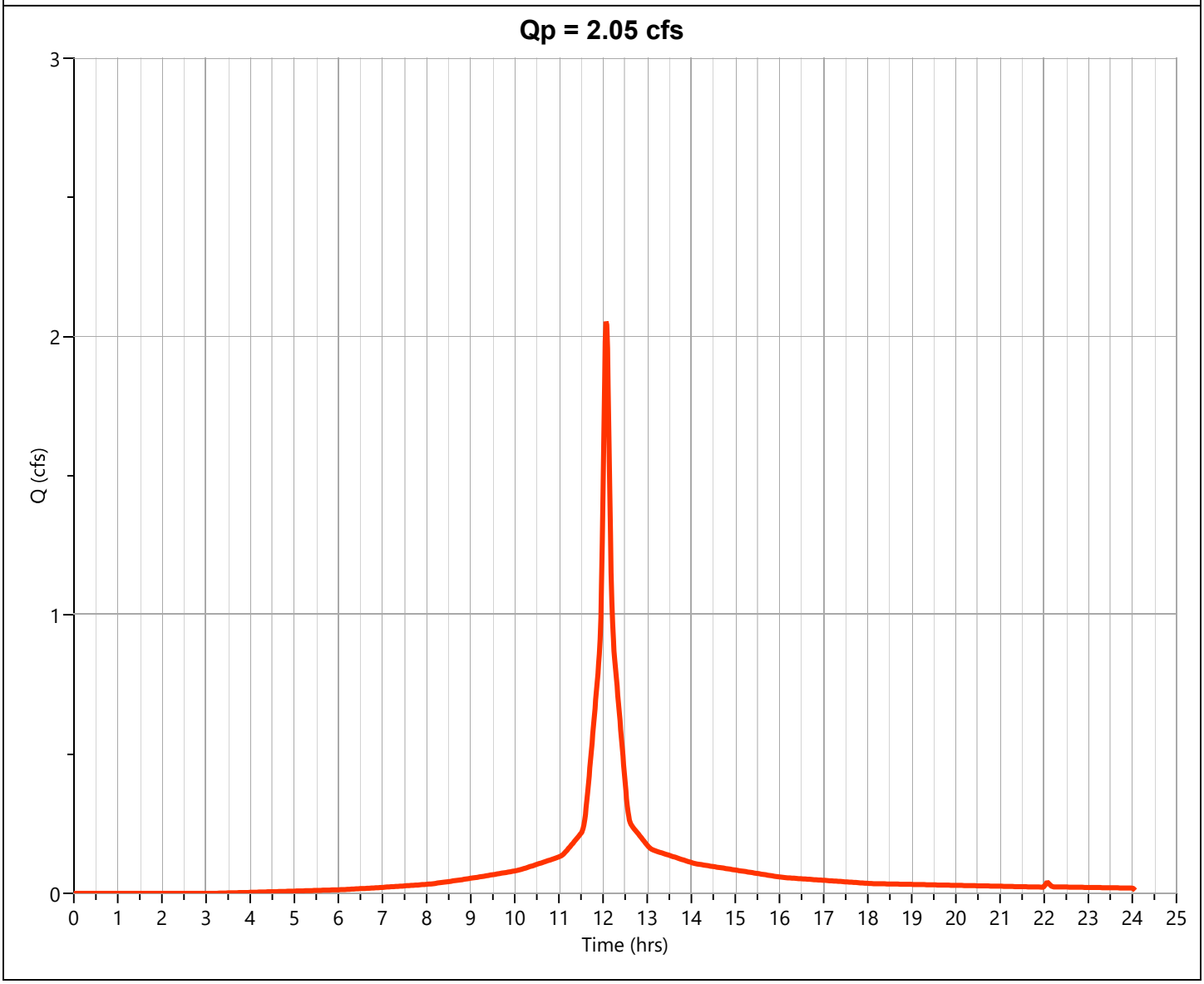
P1 - Maintenance Yd

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.053 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 6,727 cuft
Drainage Area	= 0.491 ac	Curve Number	= 93.56*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.39 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.43	98	P1A - Paved/Maint Bldg Roof
0.036	61	P1B - Grass
0.025	64	P1C - Landscaped Berm
0.491	**94**	Weighted CN Method Employed



Hydrograph Report

Hydrology Studio v 1.0.0.0

03-19-2020

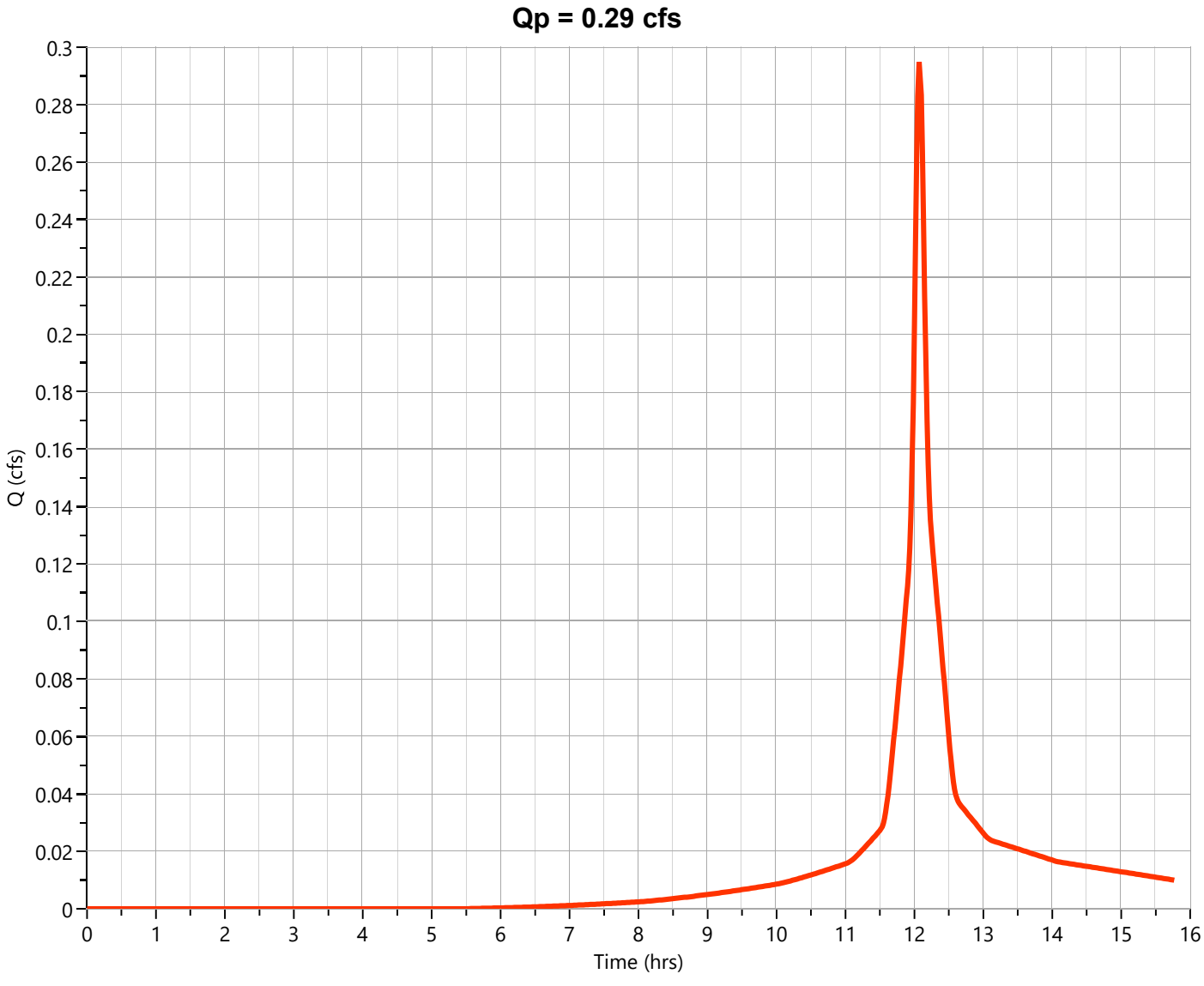
P2 - Upper walkways

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.295 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 926 cuft
Drainage Area	= 0.08 ac	Curve Number	= 88*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.39 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.065	62	P2C Grass
0.129	61	P2D, E, F, G, H Grass
0.12	64	P2J Grass/Mulch
0.08	**88**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

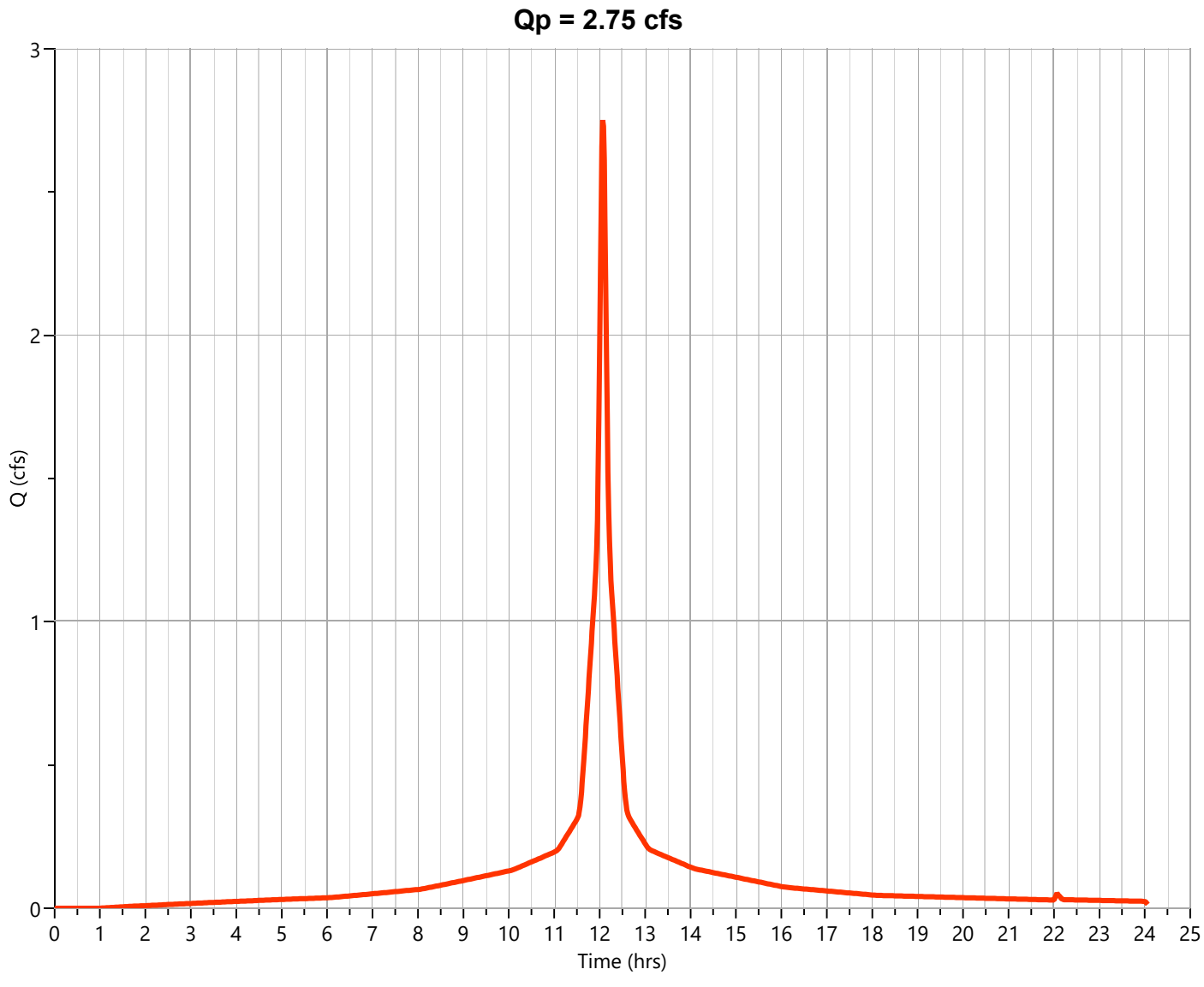
P2 - Parking Lot

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.750 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 9,642 cuft
Drainage Area	= 0.62 ac	Curve Number	= 98*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.39 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.537	98	P2A - Impervious
0.084	98	P2B - Impervious
0.62	**98**	Weighted CN Method Employed



Hydrograph Report

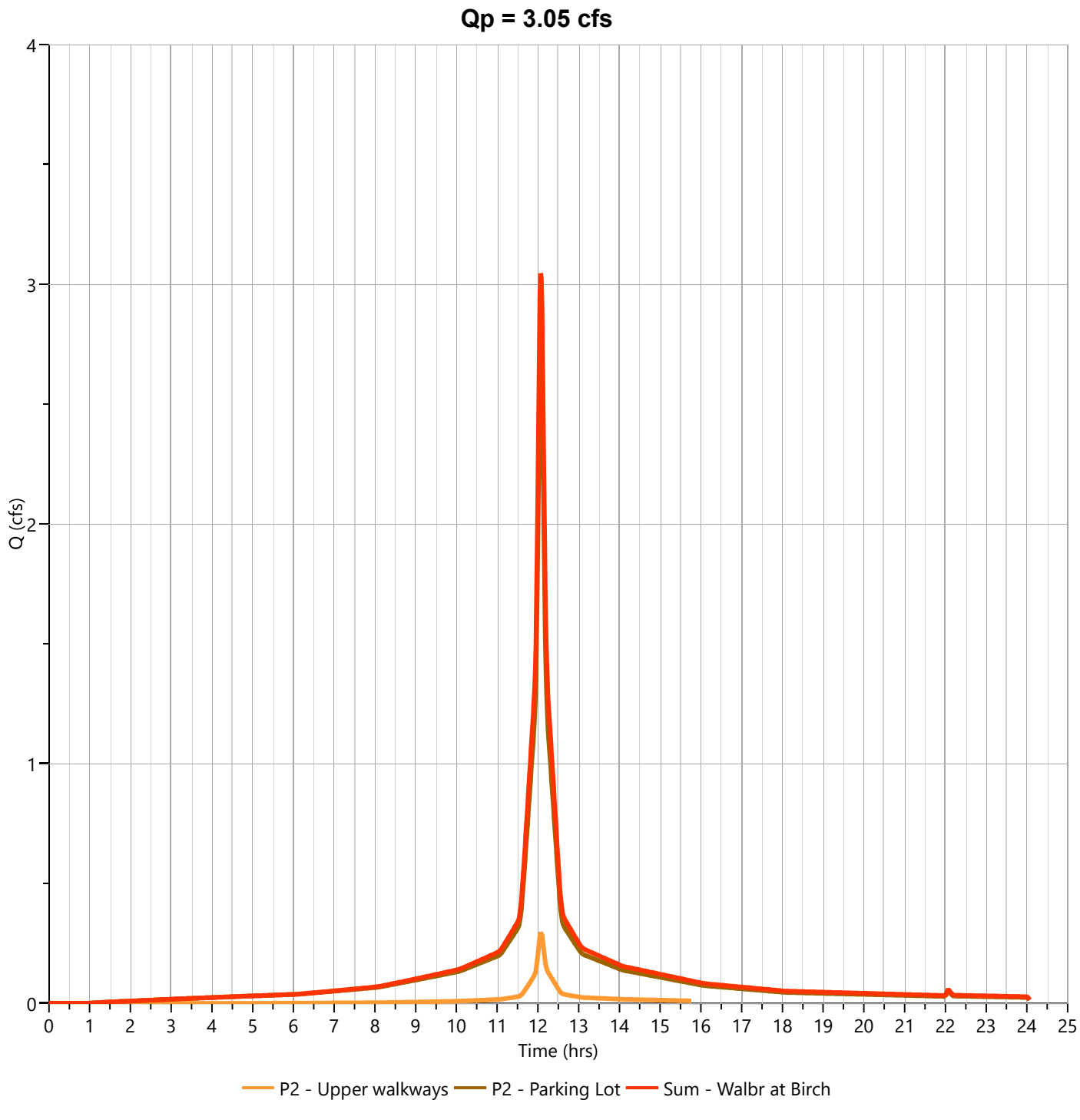
Hydrology Studio v 1.0.0.0

03-19-2020

Sum - Walbr at Birch

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 3.045 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 10,568 cuft
Inflow Hydrographs	= 5, 6	Total Contrib. Area	= 0.7 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

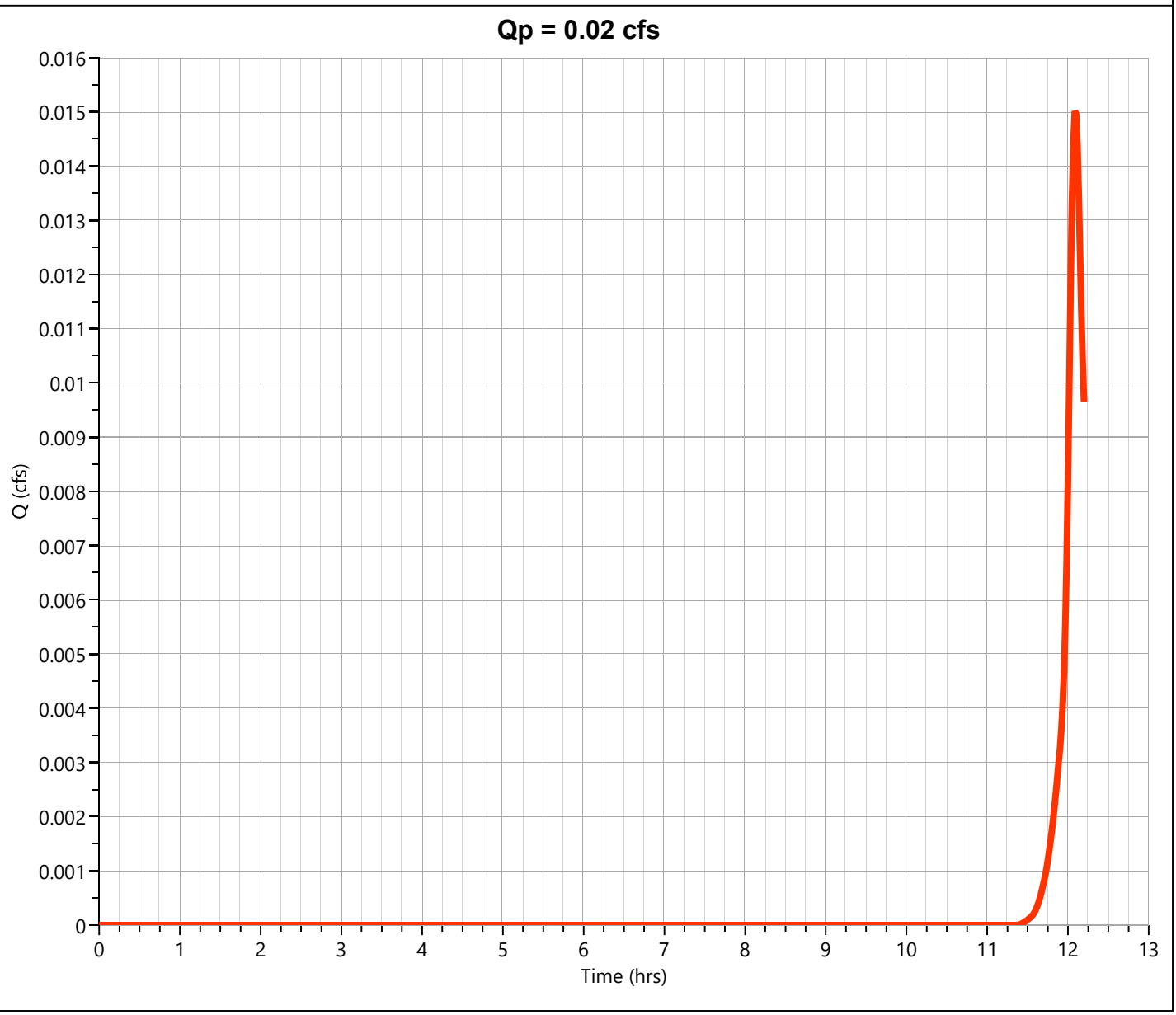
P3 - Walbridge West

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.015 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 52.4 cuft
Drainage Area	= 0.013 ac	Curve Number	= 62*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.39 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.013	62	P3A - Grass
0.013	**62**	Weighted CN Method Employed



Hydrograph Report

Hydrology Studio v 1.0.0.0

03-19-2020

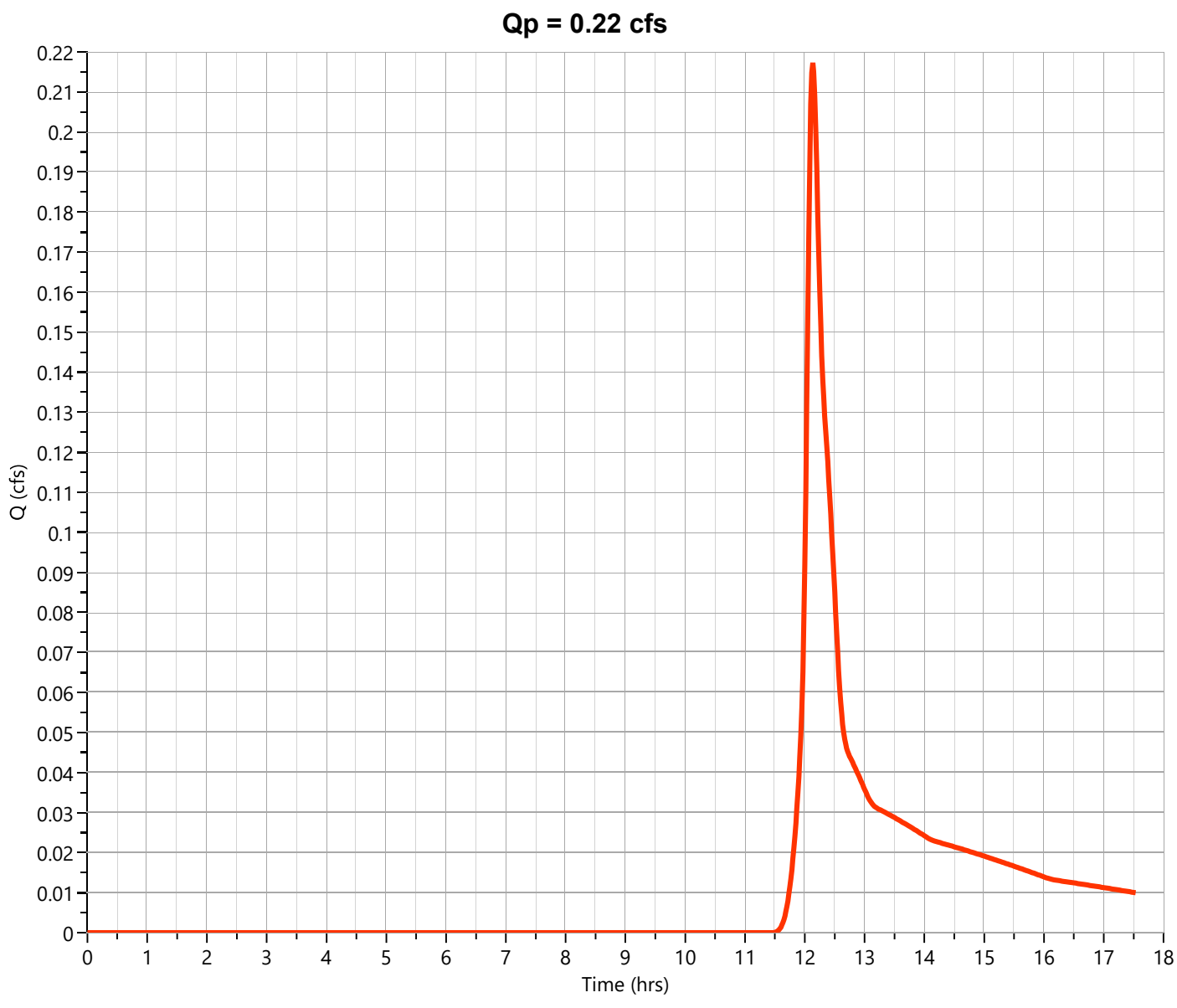
P4 - Area to WQB

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.217 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 861 cuft
Drainage Area	= 0.233 ac	Curve Number	= 61*
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 4.39 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.233	61	P4A - Pervious (grass/mulch)
0.233	**61**	Weighted CN Method Employed



Hydrograph Report

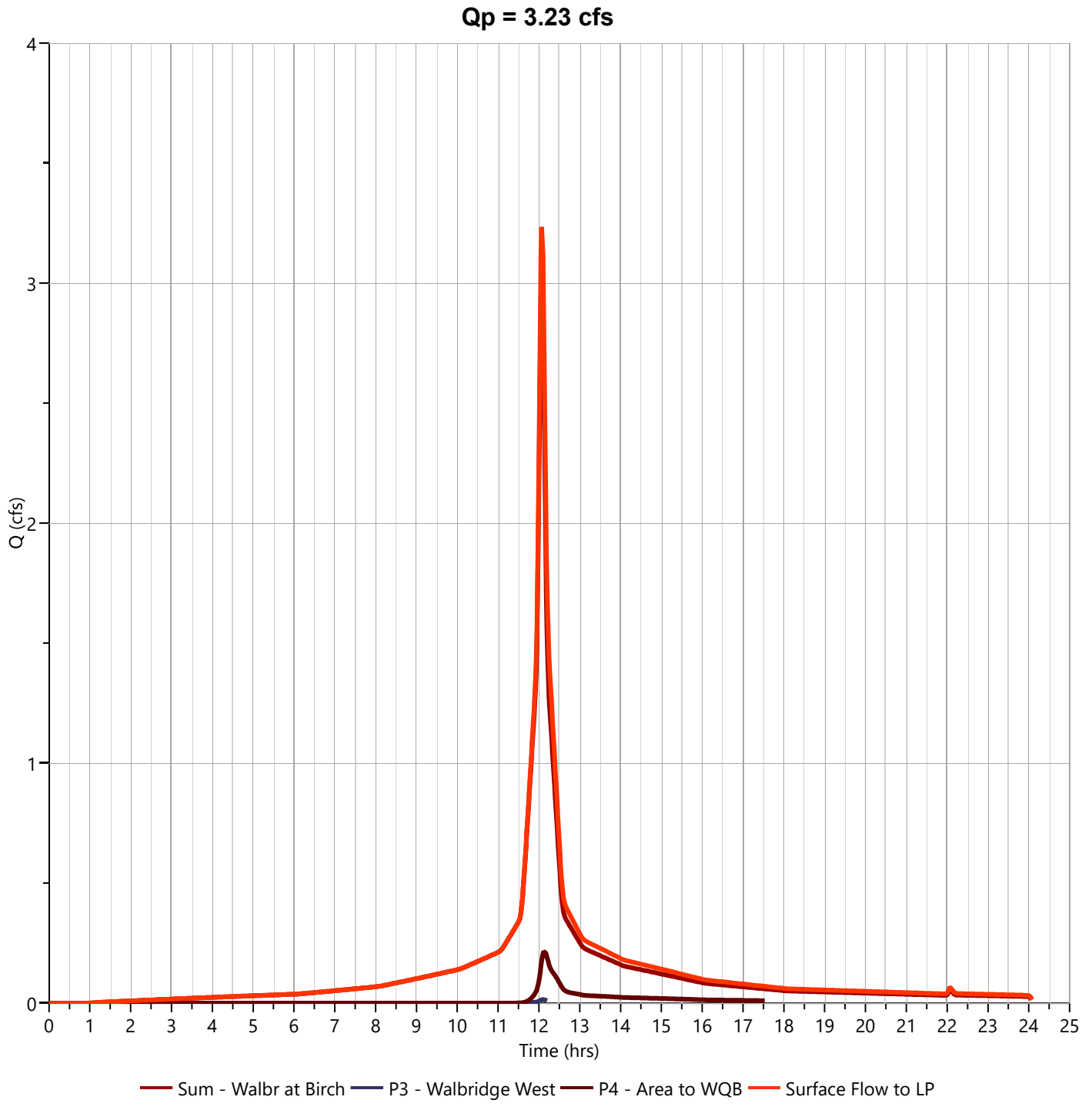
Hydrology Studio v 1.0.0.0

03-19-2020

Post Surface Flow to LP

Hyd. No. 10

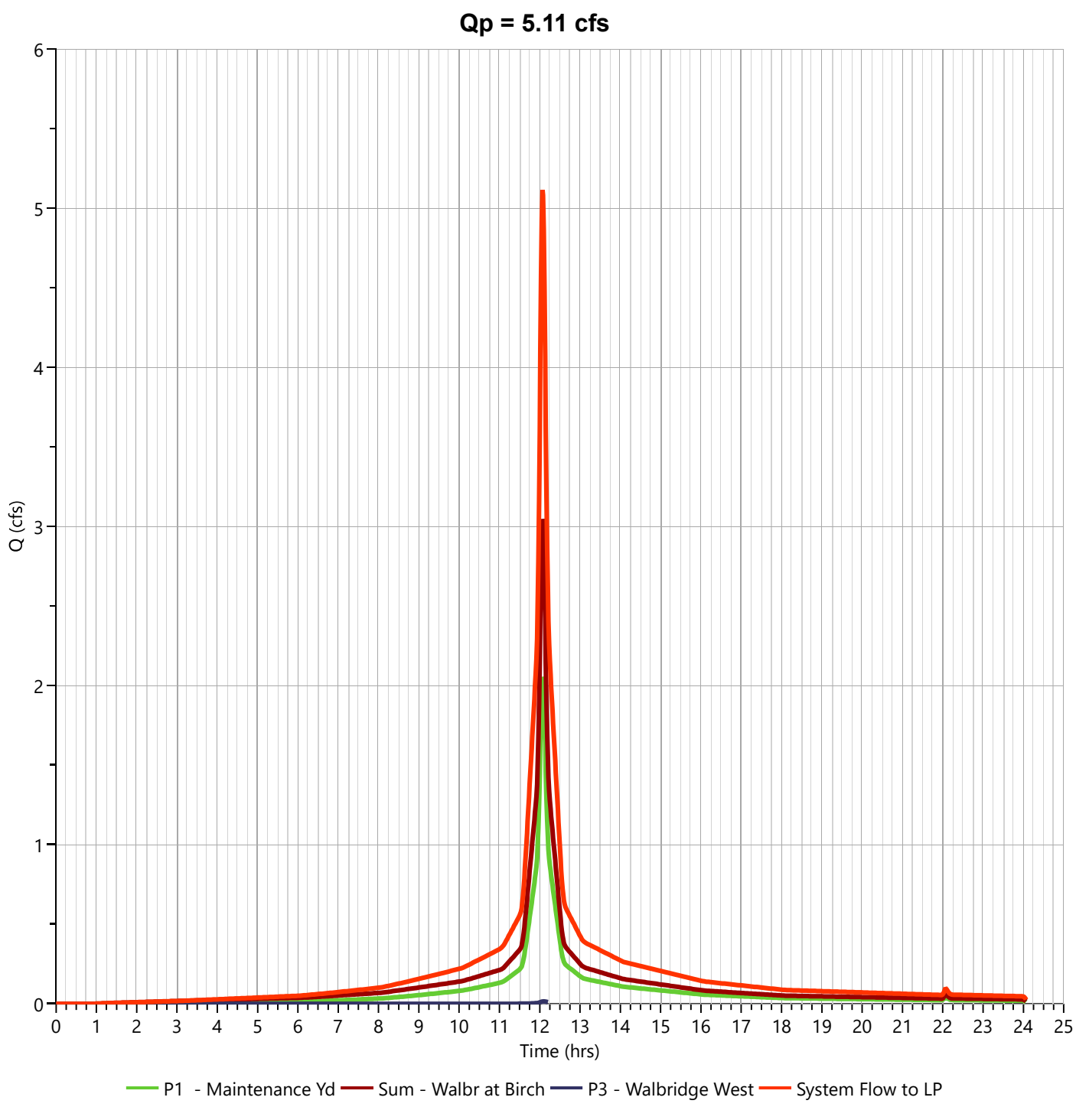
Hydrograph Type	= Junction	Peak Flow	= 3.234 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,482 cuft
Inflow Hydrographs	= 7, 8, 9	Total Contrib. Area	= 0.946 ac



Post System Flow to LP

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 5.113 cfs
Storm Frequency	= 5-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 17,347 cuft
Inflow Hydrographs	= 4, 7, 8	Total Contrib. Area	= 1.204 ac



Design Storm Report

Custom Storm filename: Bridgeport - 24 HR.cds

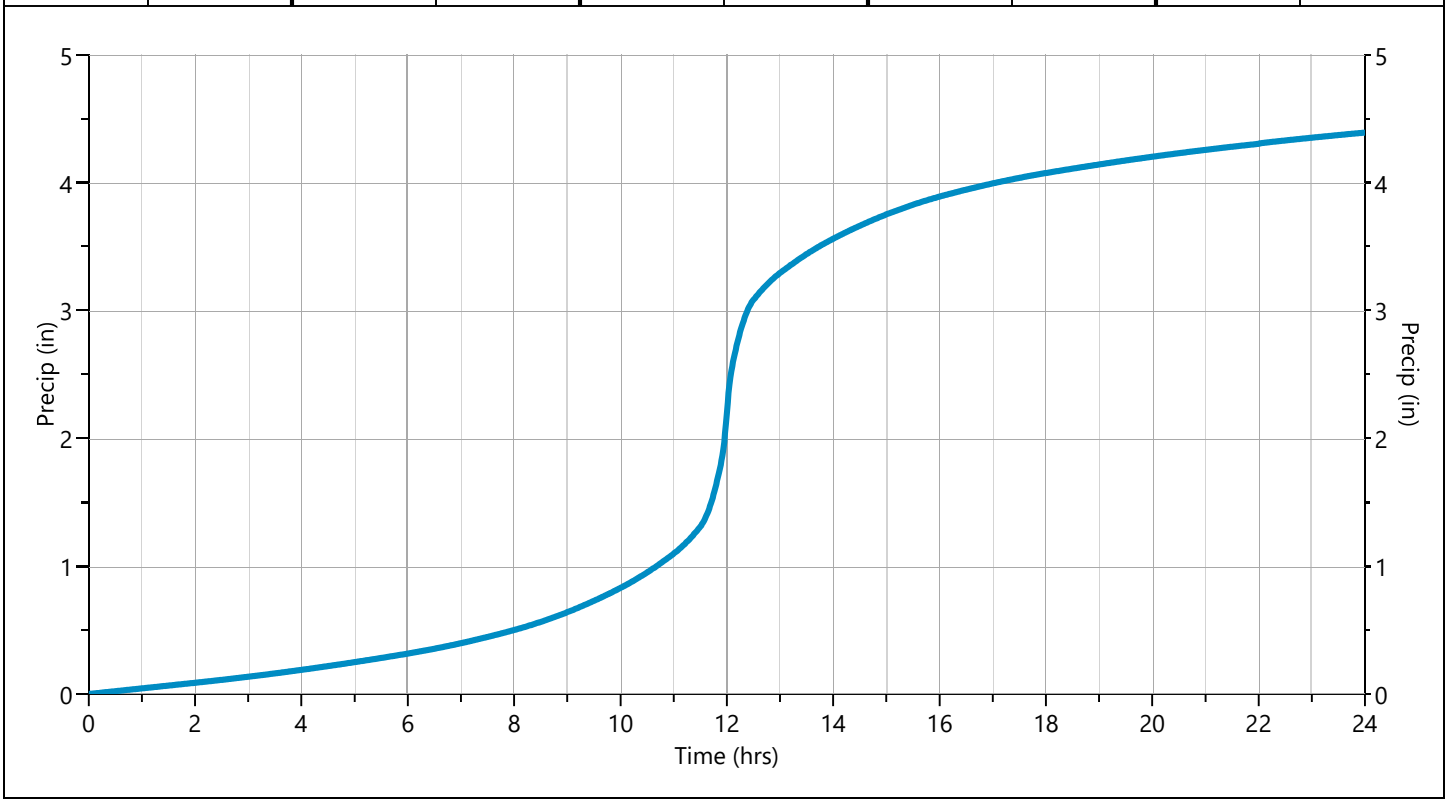
Hydrology Studio v 1.0.0.0

03-19-2020

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	✔ 5-yr	10-yr	25-yr	50-yr	100-yr	
24 hrs	2.64	3.30	0.00	4.39	5.30	6.54	7.50	8.46	

Incremental Rainfall Distribution, 5-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.50	0.008651	11.68	0.019974	11.87	0.031779	12.05	0.065959	12.23	0.026413
11.52	0.009218	11.70	0.021048	11.88	0.032852	12.07	0.056960	12.25	0.025340
11.53	0.010316	11.72	0.022121	11.90	0.033925	12.08	0.047960	12.27	0.024267
11.55	0.011390	11.73	0.023194	11.92	0.039087	12.10	0.038961	12.28	0.023194
11.57	0.012463	11.75	0.024267	11.93	0.047961	12.12	0.034054	12.30	0.022121
11.58	0.013536	11.77	0.025340	11.95	0.056960	12.13	0.032852	12.32	0.021048
11.60	0.014609	11.78	0.026413	11.97	0.065960	12.15	0.031779	12.33	0.019974
11.62	0.015682	11.80	0.027486	11.98	0.074960	12.17	0.030706	12.35	0.018902
11.63	0.016755	11.82	0.028559	**12.00**	**0.083959**	12.18	0.029633	12.37	0.017828
11.65	0.017828	11.83	0.029633	12.02	0.083758	12.20	0.028559	12.38	0.016755
11.67	0.018901	11.85	0.030706	12.03	0.074959	12.22	0.027486	12.40	0.015682



Hydrograph 10-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	6.274	12.08	19,421	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.390	12.08	1,202	----		
3	Junction	Pre Ex to Walbridg LP	6.664	12.08	20,623	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	2.524	12.07	8,372	----		
5	NRCS Runoff	P2 - Upper walkways	0.373	12.07	1,184	----		
6	NRCS Runoff	P2 - Parking Lot	3.328	12.07	11,750	----		
7	Junction	Sum - Walbr at Birch	3.701	12.07	12,935	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.024	12.08	79.2	----		
9	NRCS Runoff	P4 - Area to WQB	0.355	12.13	1,313	----		
10	Junction	Post Surface Flow to LP	4.024	12.08	14,327	7, 8, 9		
11	Junction	Post System Flow to LP	6.249	12.07	21,386	4, 7, 8		

Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

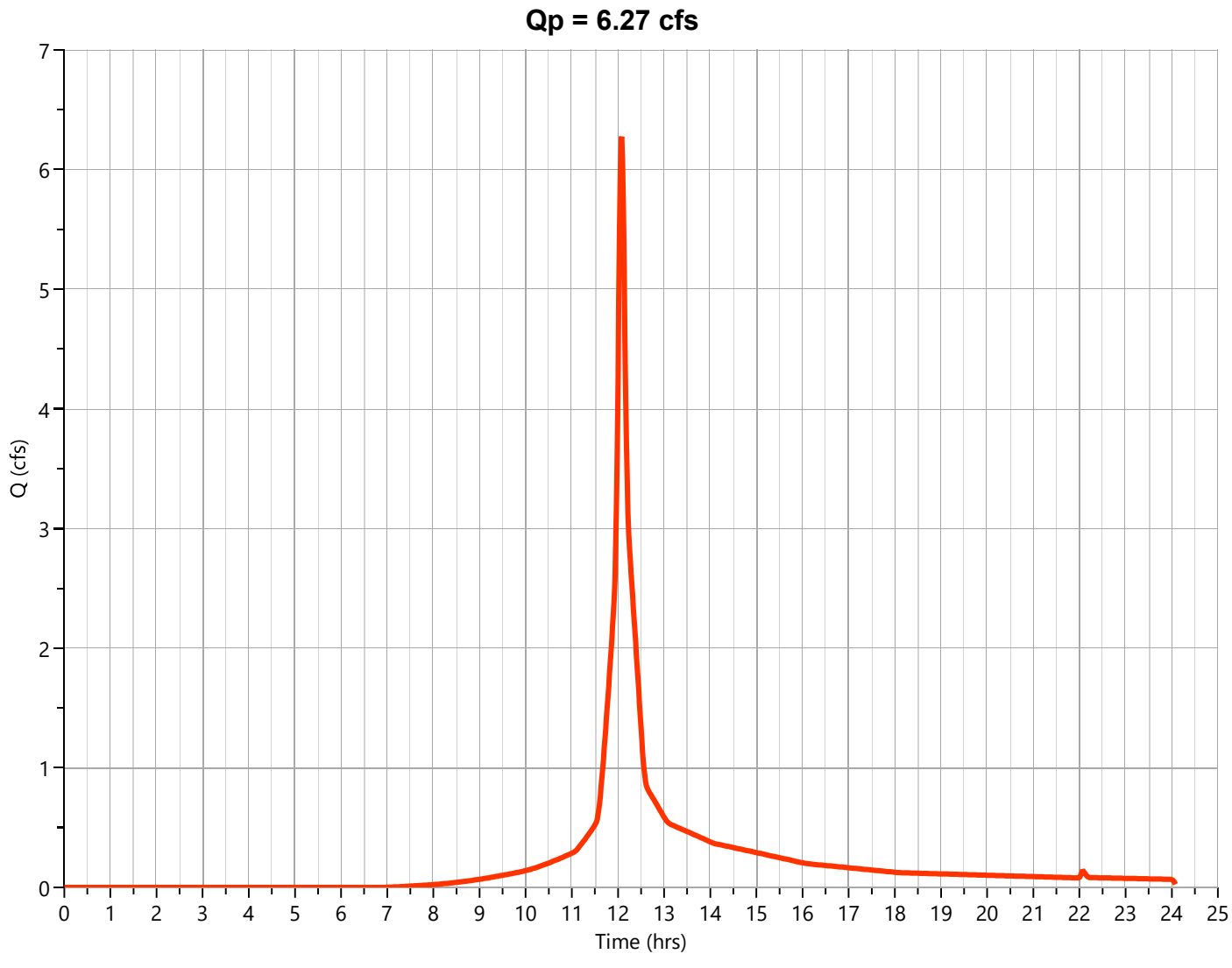
E1 - Ex. Conditions

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.274 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 19,421 cuft
Drainage Area	= 1.586 ac	Curve Number	= 81.2*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.257	98	Paved E1B, C, D
0.709	89	Millings E1A
0.579	63	Grass/Mulch E1F, G, H, J, K
0.041	98	Maint. Bldg. Roof E1E
1.586	**81**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

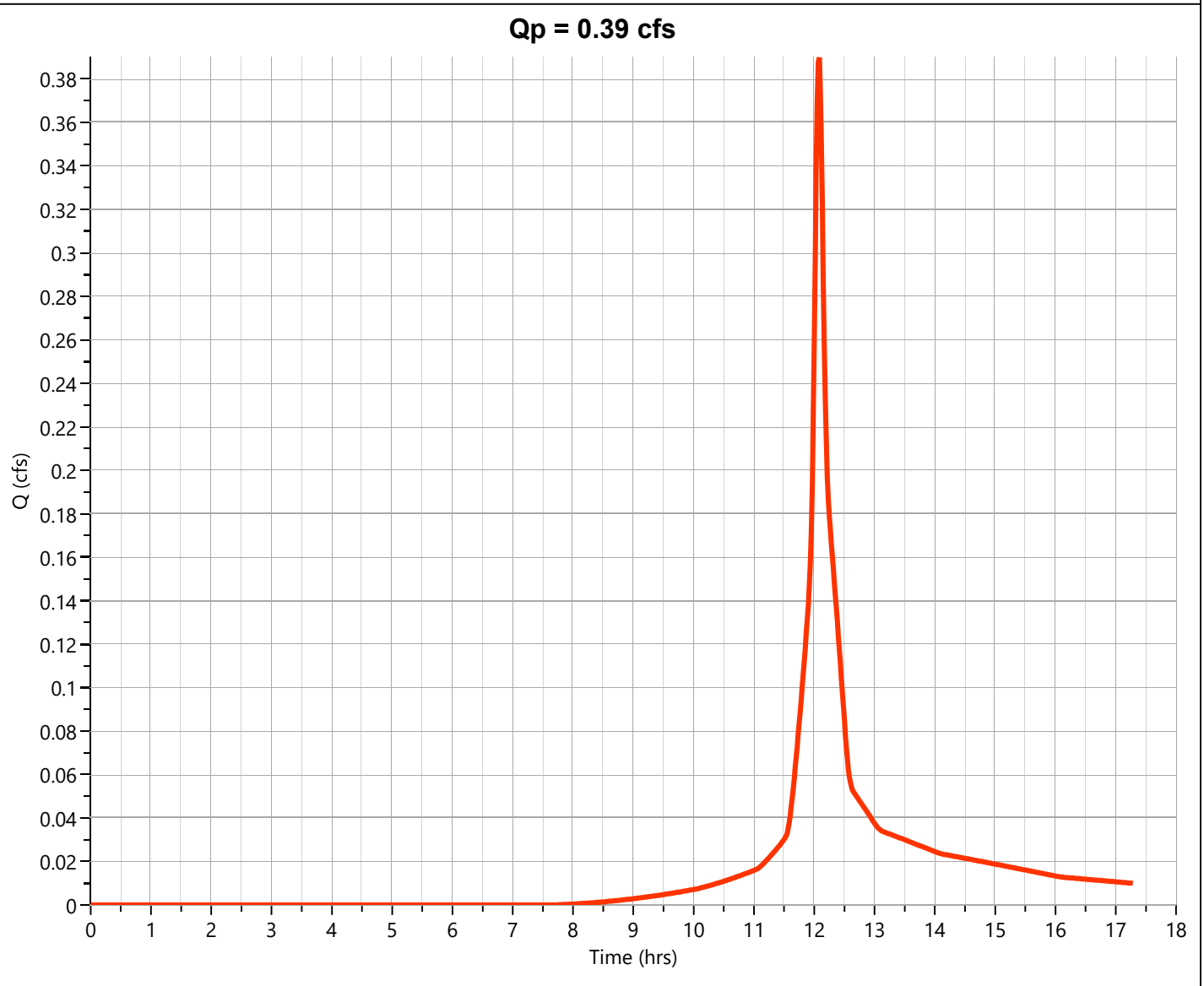
E2 - Ex. to Walbrid

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.390 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 1,202 cuft
Drainage Area	= 0.107 ac	Curve Number	= 78.34*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.034	89	Millings E2A
0.011	98	Pavement E2B
0.062	69	Grass/Mulch E2C
0.107	**78**	Weighted CN Method Employed



Hydrograph Report

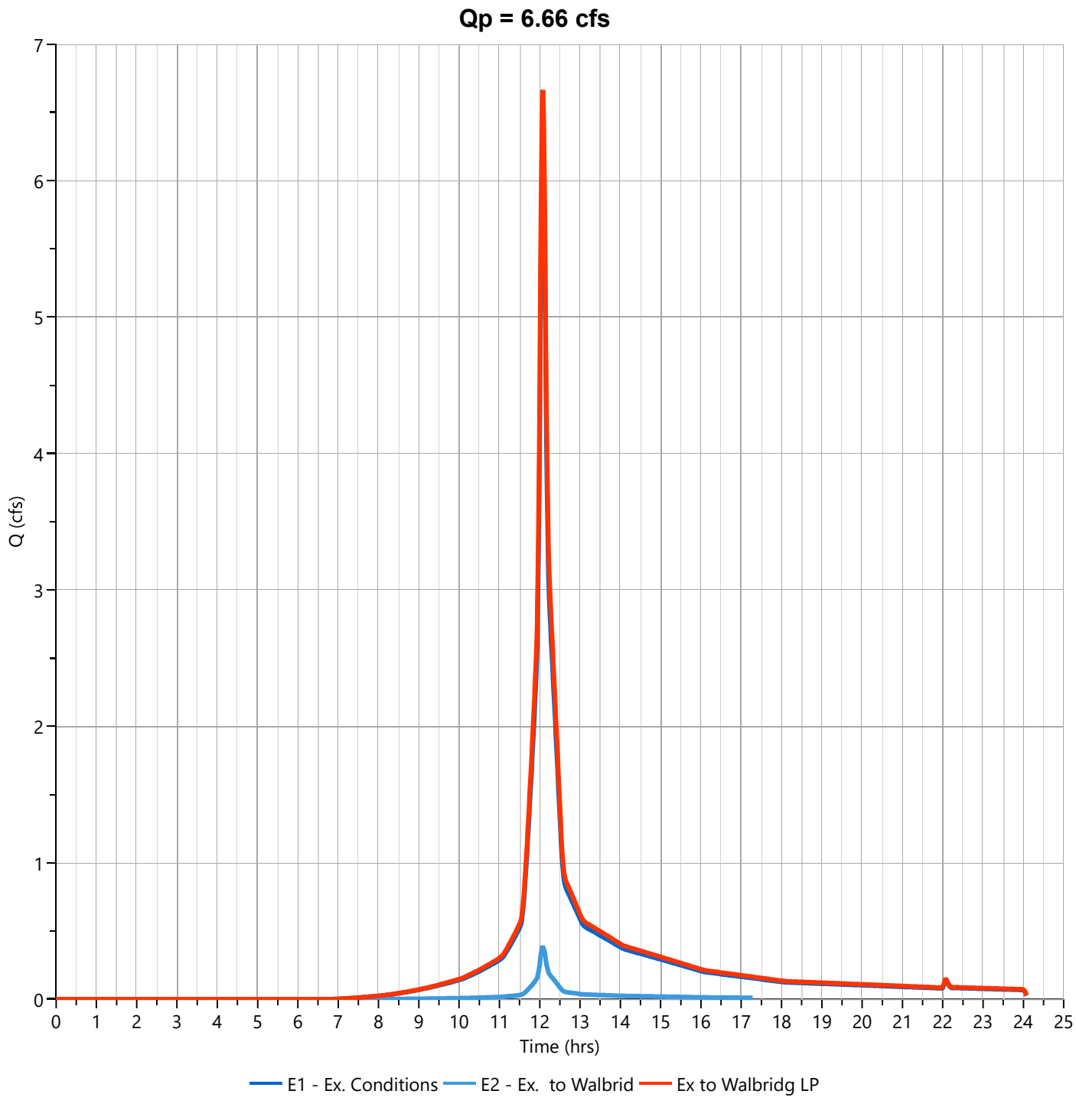
Hydrology Studio v 1.0.0.0

03-19-2020

Pre Ex to Walbridg LP

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 6.664 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Hydrograph Volume	= 20,623 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 1.693 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

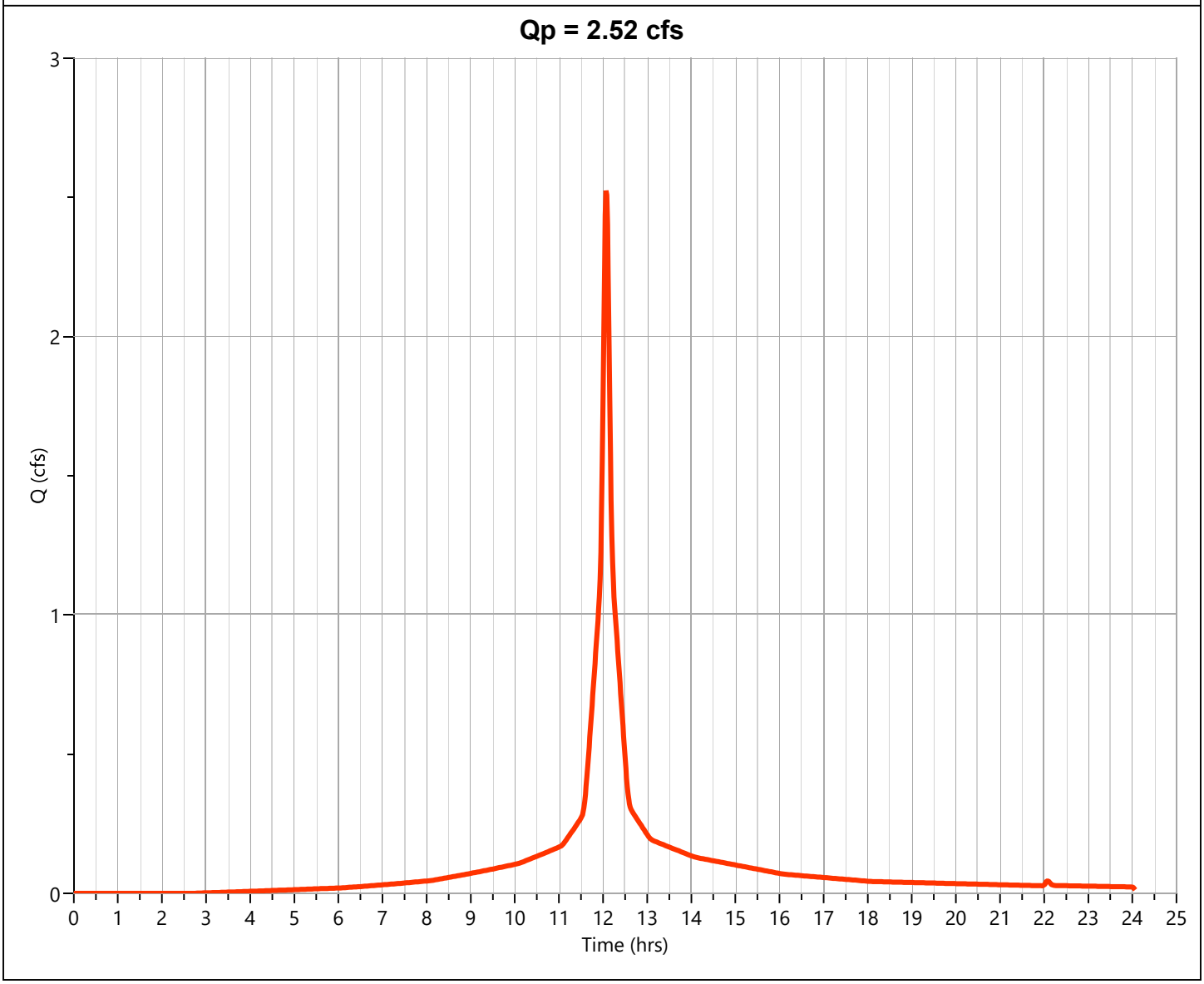
P1 - Maintenance Yd

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.524 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 8,372 cuft
Drainage Area	= 0.491 ac	Curve Number	= 93.56*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.43	98	P1A - Paved/Maint Bldg Roof
0.036	61	P1B - Grass
0.025	64	P1C - Landscaped Berm
0.491	**94**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

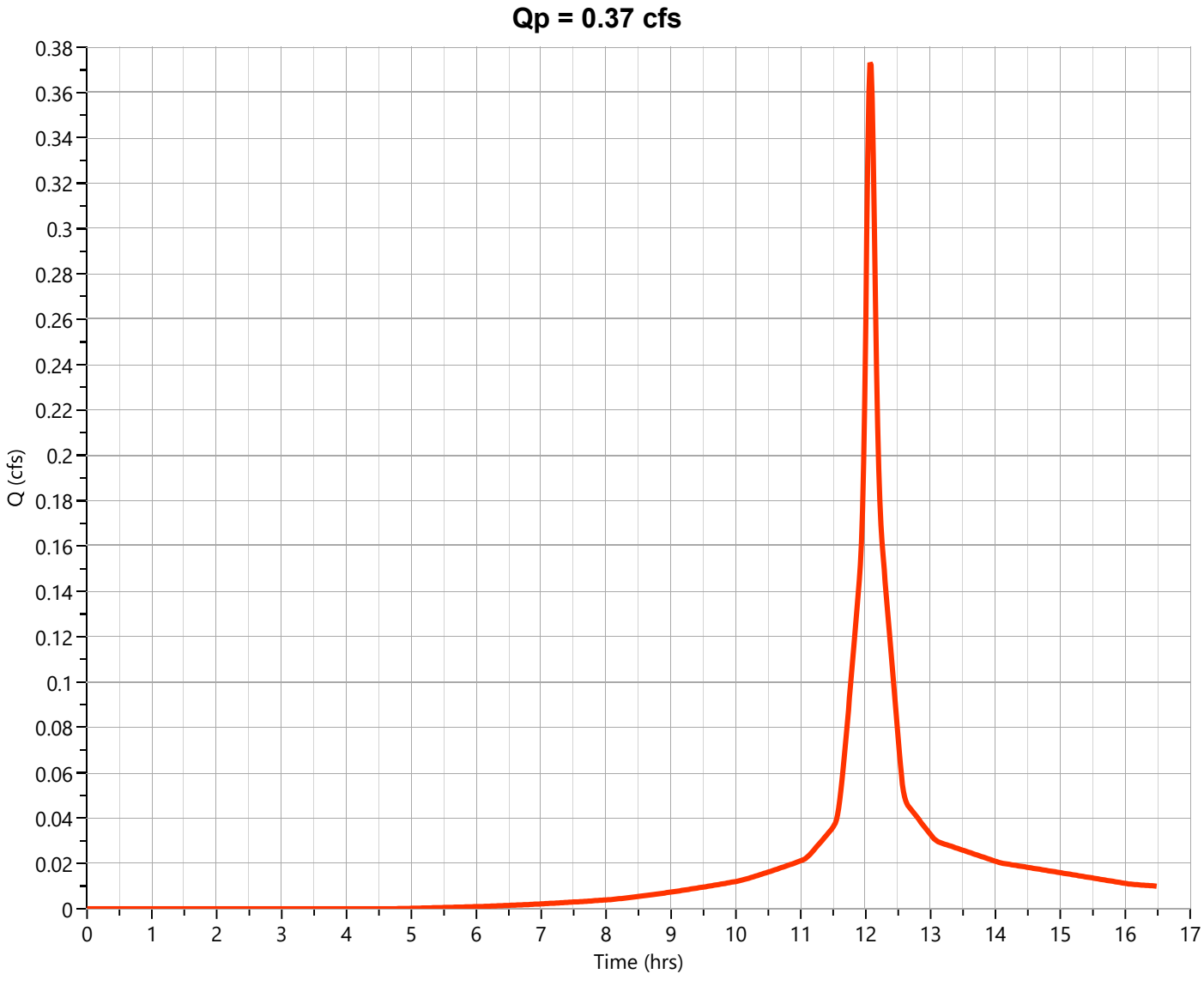
P2 - Upper walkways

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.373 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 1,184 cuft
Drainage Area	= 0.08 ac	Curve Number	= 88*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.065	62	P2C Grass
0.129	61	P2D, E, F, G, H Grass
0.12	64	P2J Grass/Mulch
0.08	**88**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

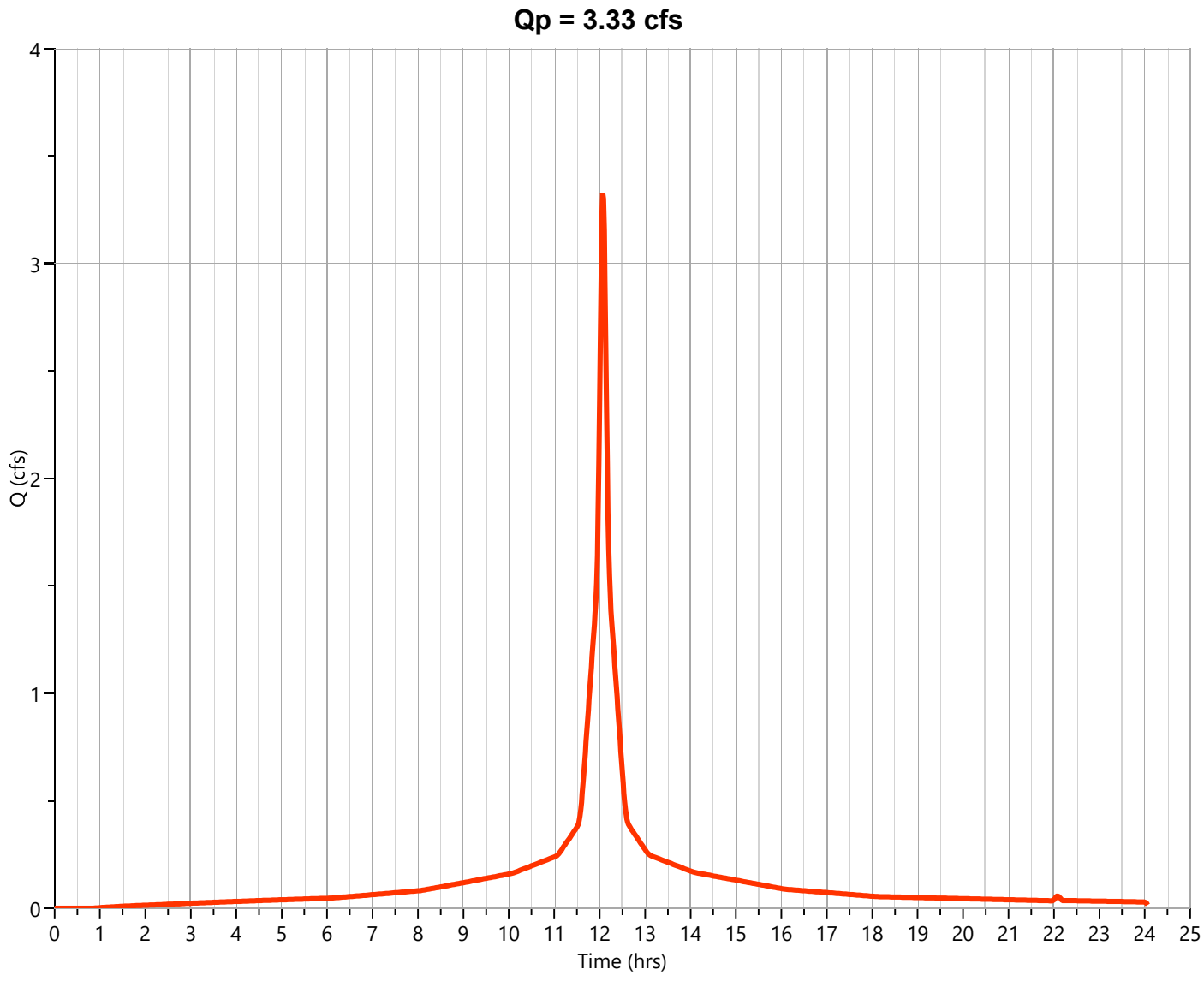
P2 - Parking Lot

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.328 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 11,750 cuft
Drainage Area	= 0.62 ac	Curve Number	= 98*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.537	98	P2A - Impervious
0.084	98	P2B - Impervious
0.62	**98**	Weighted CN Method Employed



Hydrograph Report

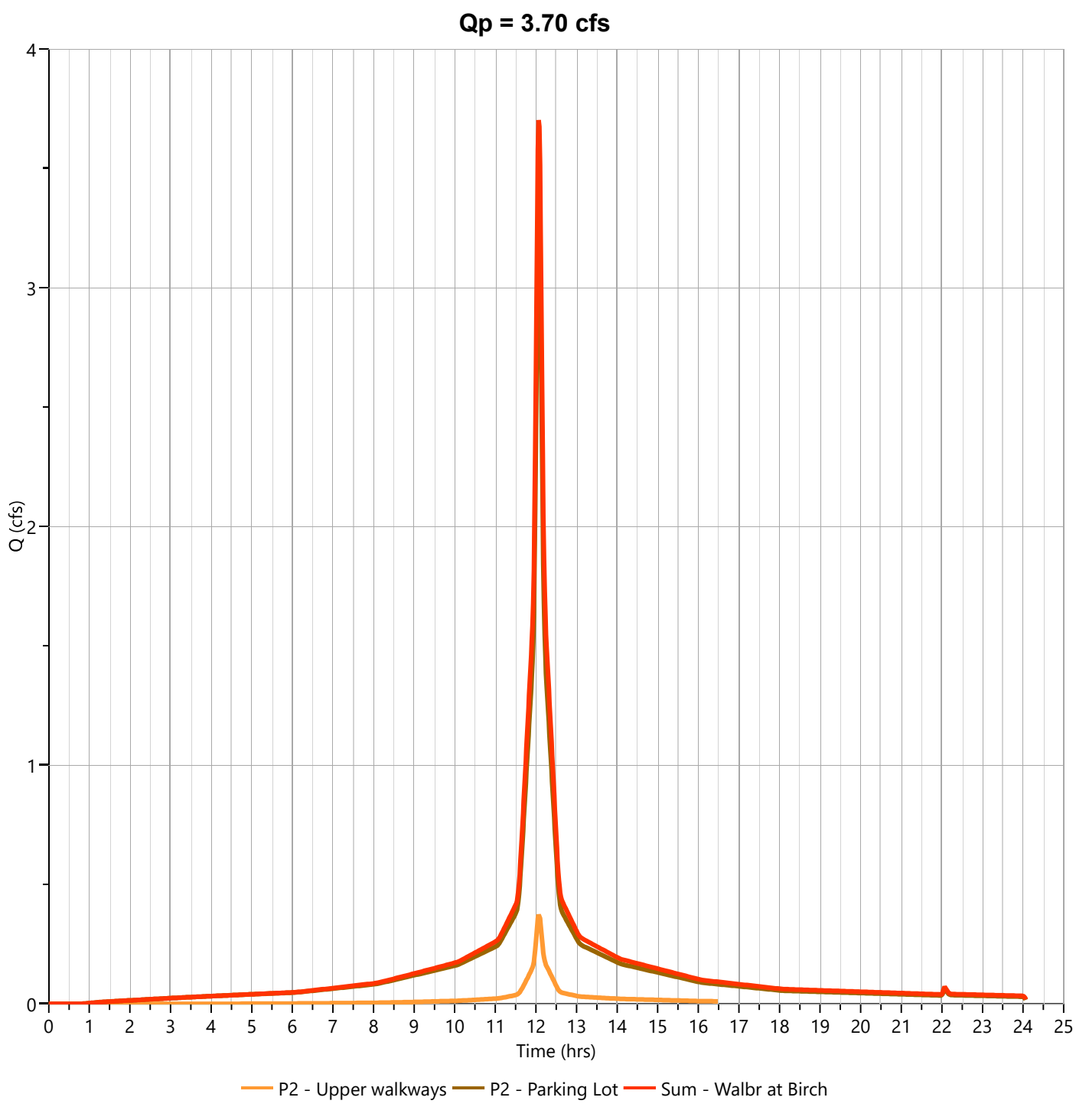
Hydrology Studio v 1.0.0.0

03-19-2020

Sum - Walbr at Birch

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 3.701 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 12,935 cuft
Inflow Hydrographs	= 5, 6	Total Contrib. Area	= 0.7 ac



Hydrograph Report

Hydrology Studio v 1.0.0.0

03-19-2020

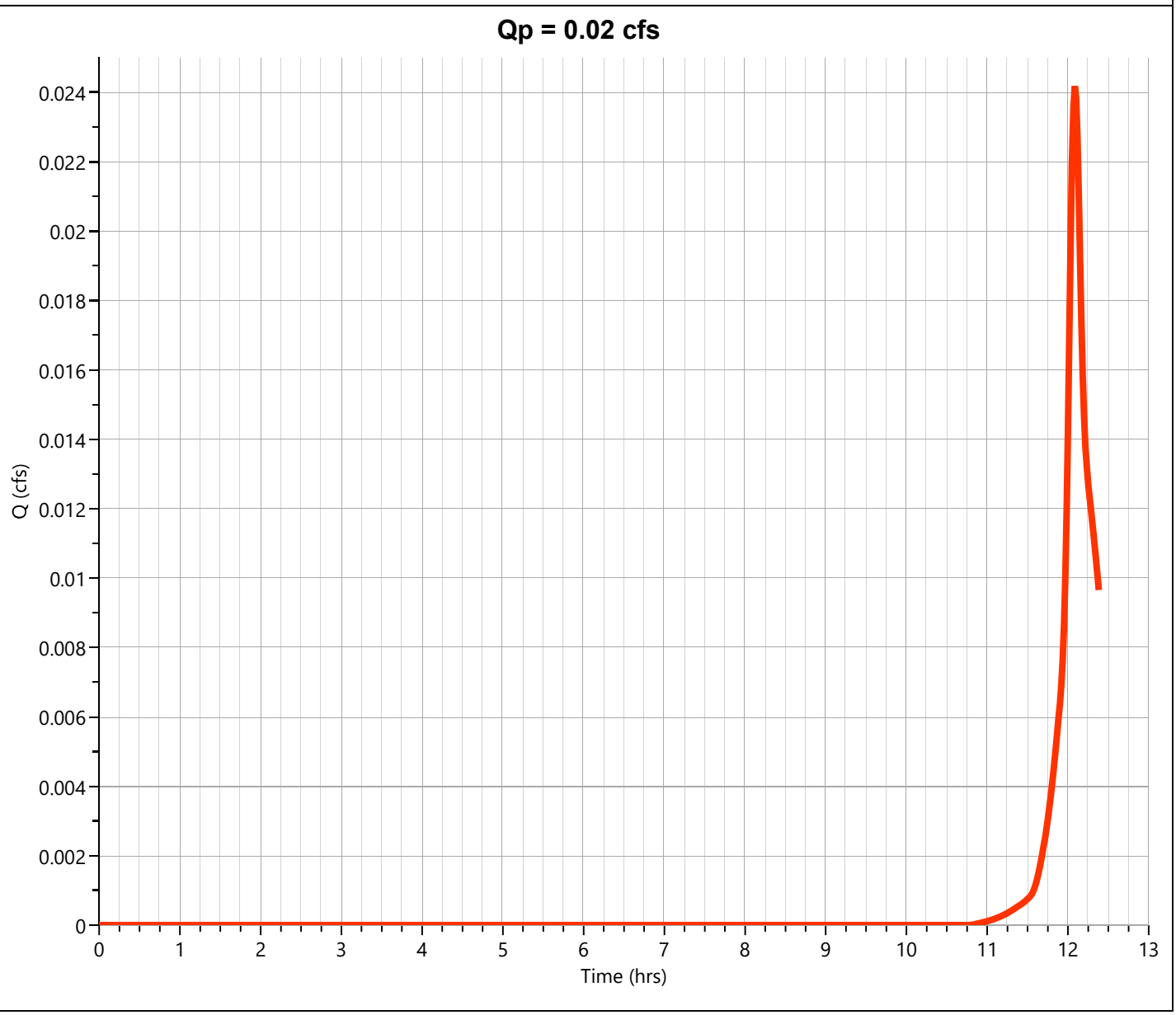
P3 - Walbridge West

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.024 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 79.2 cuft
Drainage Area	= 0.013 ac	Curve Number	= 62*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.013	62	P3A - Grass
0.013	**62**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

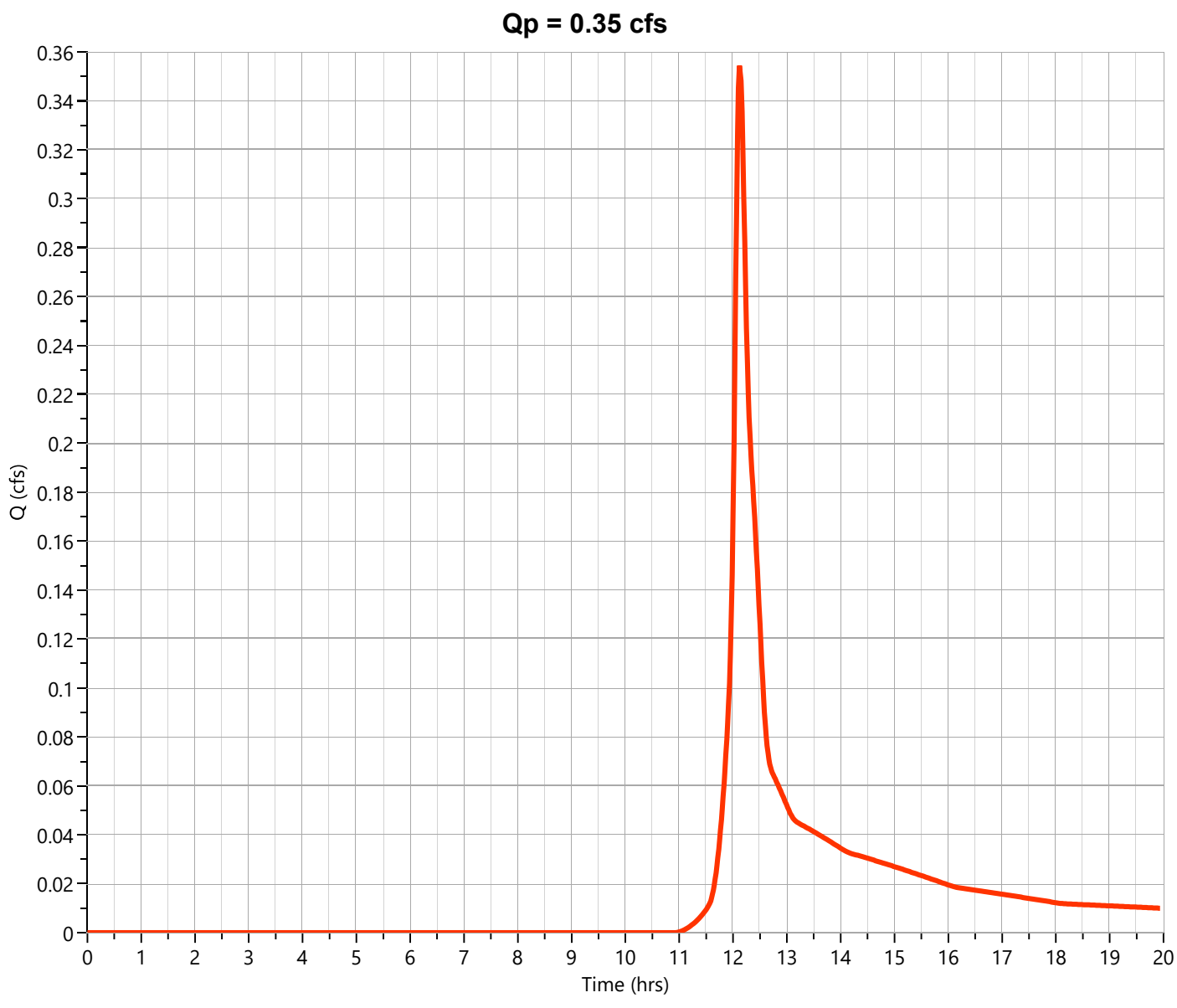
P4 - Area to WQB

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.355 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 1,313 cuft
Drainage Area	= 0.233 ac	Curve Number	= 61*
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.30 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.233	61	P4A - Pervious (grass/mulch)
0.233	**61**	Weighted CN Method Employed



Hydrograph Report

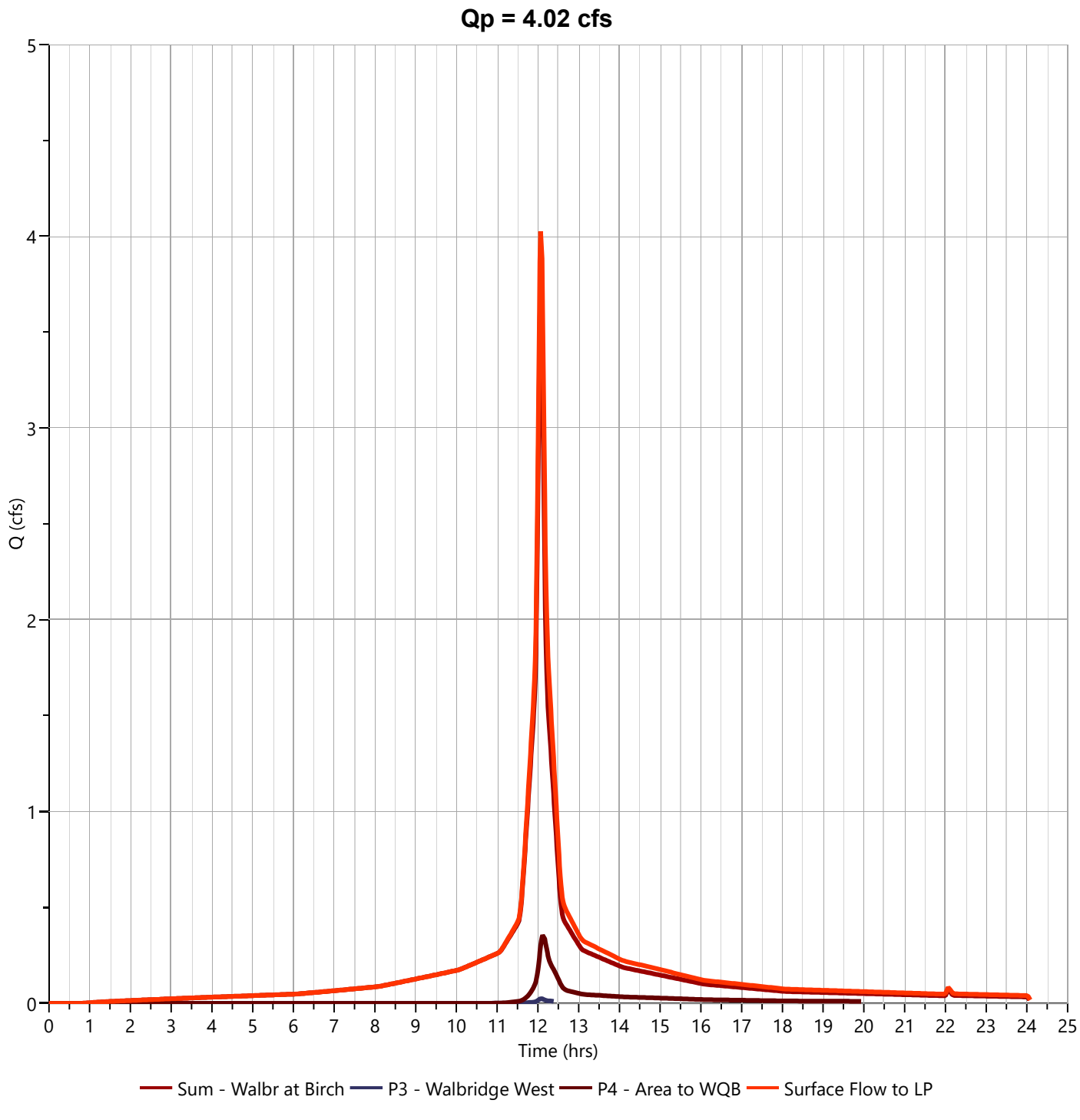
Hydrology Studio v 1.0.0.0

03-19-2020

Post Surface Flow to LP

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 4.024 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Hydrograph Volume	= 14,327 cuft
Inflow Hydrographs	= 7, 8, 9	Total Contrib. Area	= 0.946 ac



Hydrograph Report

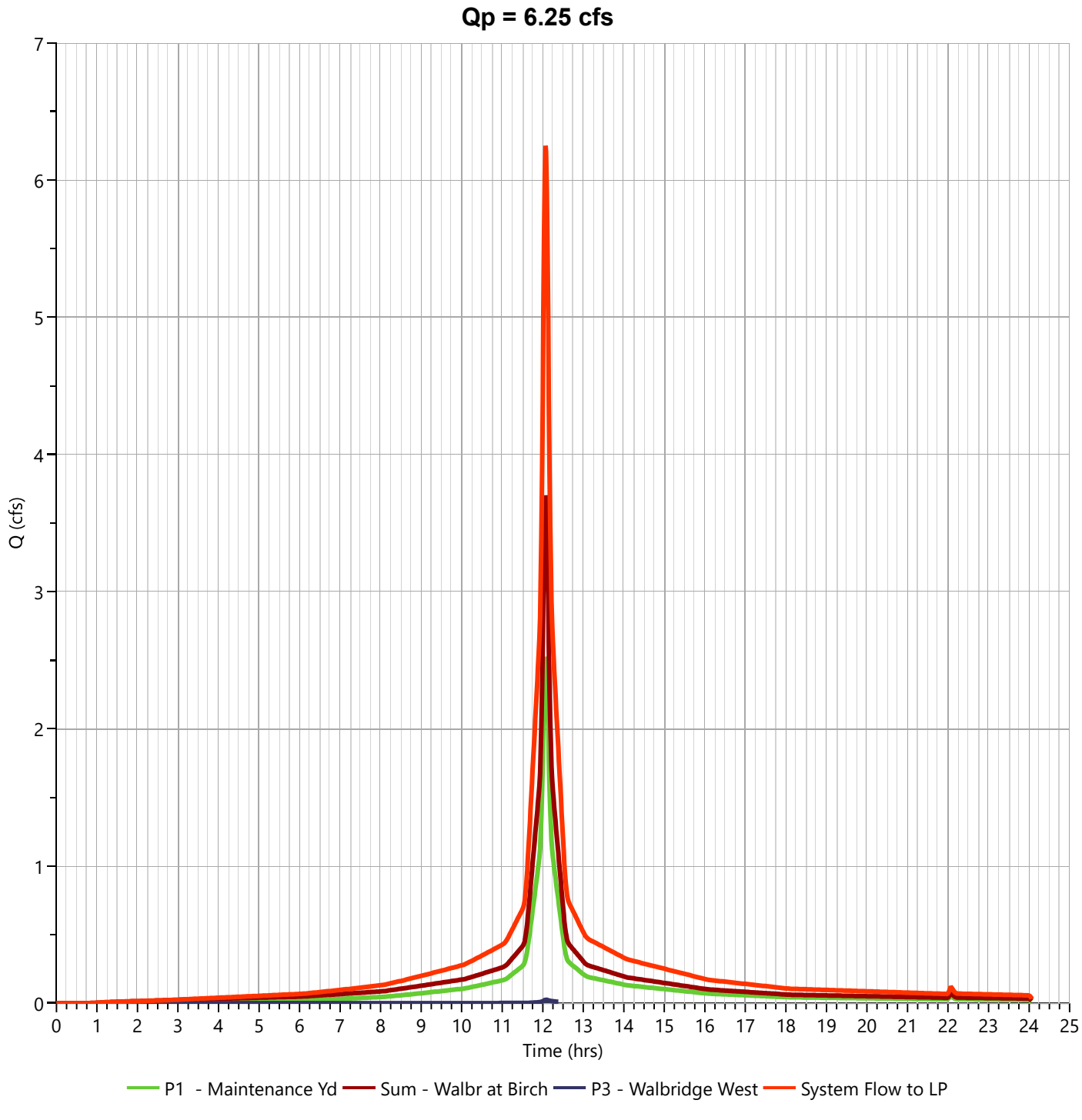
Hydrology Studio v 1.0.0.0

03-19-2020

Post System Flow to LP

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 6.249 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 21,386 cuft
Inflow Hydrographs	= 4, 7, 8	Total Contrib. Area	= 1.204 ac



Design Storm Report

Custom Storm filename: Bridgeport - 24 HR.cds

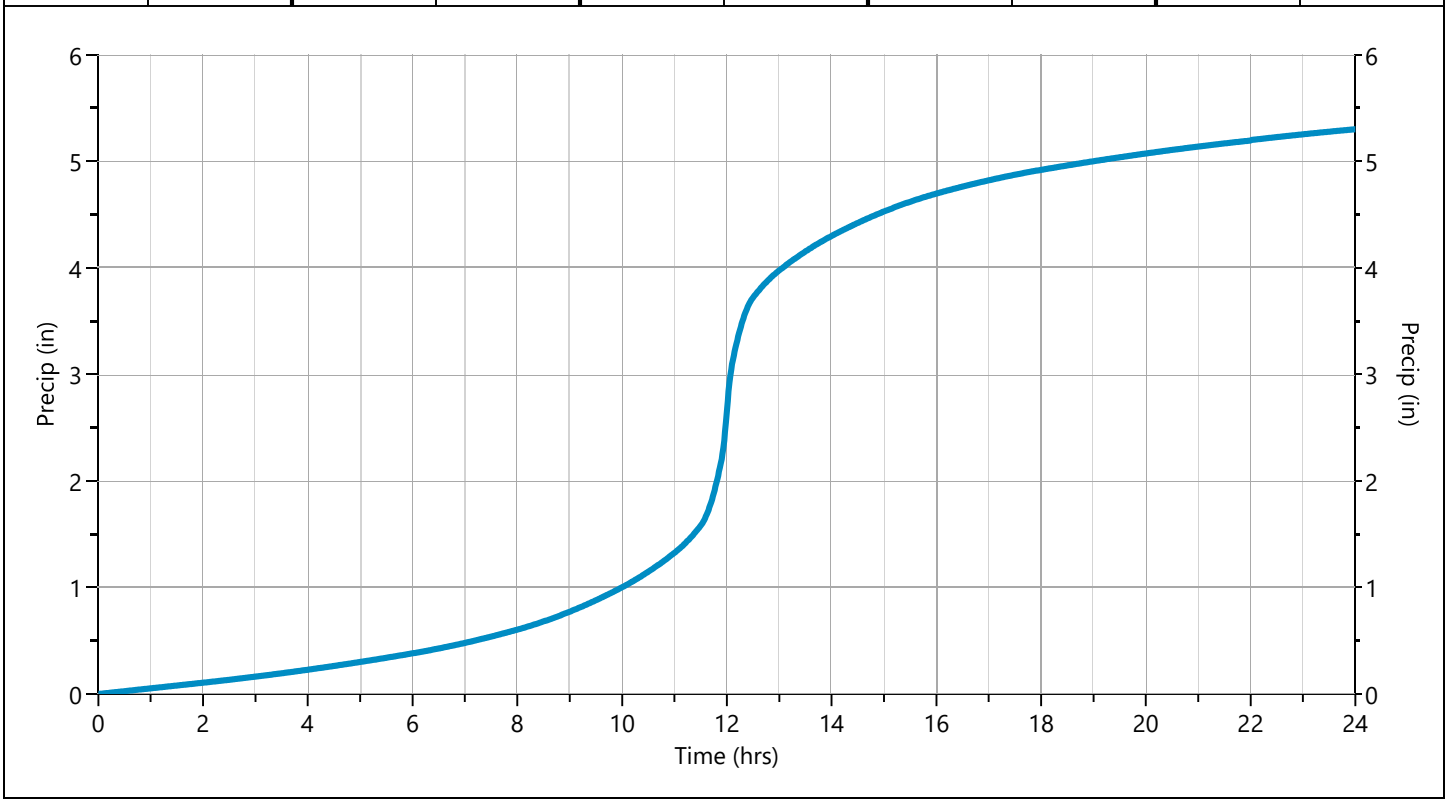
Hydrology Studio v 1.0.0.0

03-19-2020

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	5-yr	✔ 10-yr	25-yr	50-yr	100-yr	
24 hrs	2.64	3.30	0.00	4.39	5.30	6.54	7.50	8.46	

Incremental Rainfall Distribution, 10-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.50	0.010444	11.68	0.024115	11.87	0.038366	12.05	0.079632	12.23	0.031888
11.52	0.011129	11.70	0.025411	11.88	0.039662	12.07	0.068767	12.25	0.030593
11.53	0.012455	11.72	0.026706	11.90	0.040957	12.08	0.057902	12.27	0.029297
11.55	0.013750	11.73	0.028002	11.92	0.047189	12.10	0.047037	12.28	0.028002
11.57	0.015046	11.75	0.029297	11.93	0.057903	12.12	0.041113	12.30	0.026706
11.58	0.016342	11.77	0.030593	11.95	0.068768	12.13	0.039662	12.32	0.025411
11.60	0.017637	11.78	0.031888	11.97	0.079633	12.15	0.038366	12.33	0.024115
11.62	0.018933	11.80	0.033184	11.98	0.090498	12.17	0.037071	12.35	0.022820
11.63	0.020228	11.82	0.034480	**12.00**	**0.101363**	12.18	0.035775	12.37	0.021524
11.65	0.021524	11.83	0.035775	12.02	0.101120	12.20	0.034480	12.38	0.020228
11.67	0.022819	11.85	0.037071	12.03	0.090497	12.22	0.033184	12.40	0.018933



Hydrograph 25-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	8.365	12.08	26,126	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.529	12.08	1,640	----		
3	Junction	Pre Ex to Walbridg LP	8.894	12.08	27,766	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	3.161	12.07	10,625	----		
5	NRCS Runoff	P2 - Upper walkways	0.479	12.07	1,541	----		
6	NRCS Runoff	P2 - Parking Lot	4.114	12.07	14,625	----		
7	Junction	Sum - Walbr at Birch	4.594	12.07	16,166	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.038	12.08	120	----		
9	NRCS Runoff	P4 - Area to WQB	0.567	12.12	2,009	----		
10	Junction	Post Surface Flow to LP	5.128	12.08	18,295	7, 8, 9		
11	Junction	Post System Flow to LP	7.792	12.07	26,912	4, 7, 8		

Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

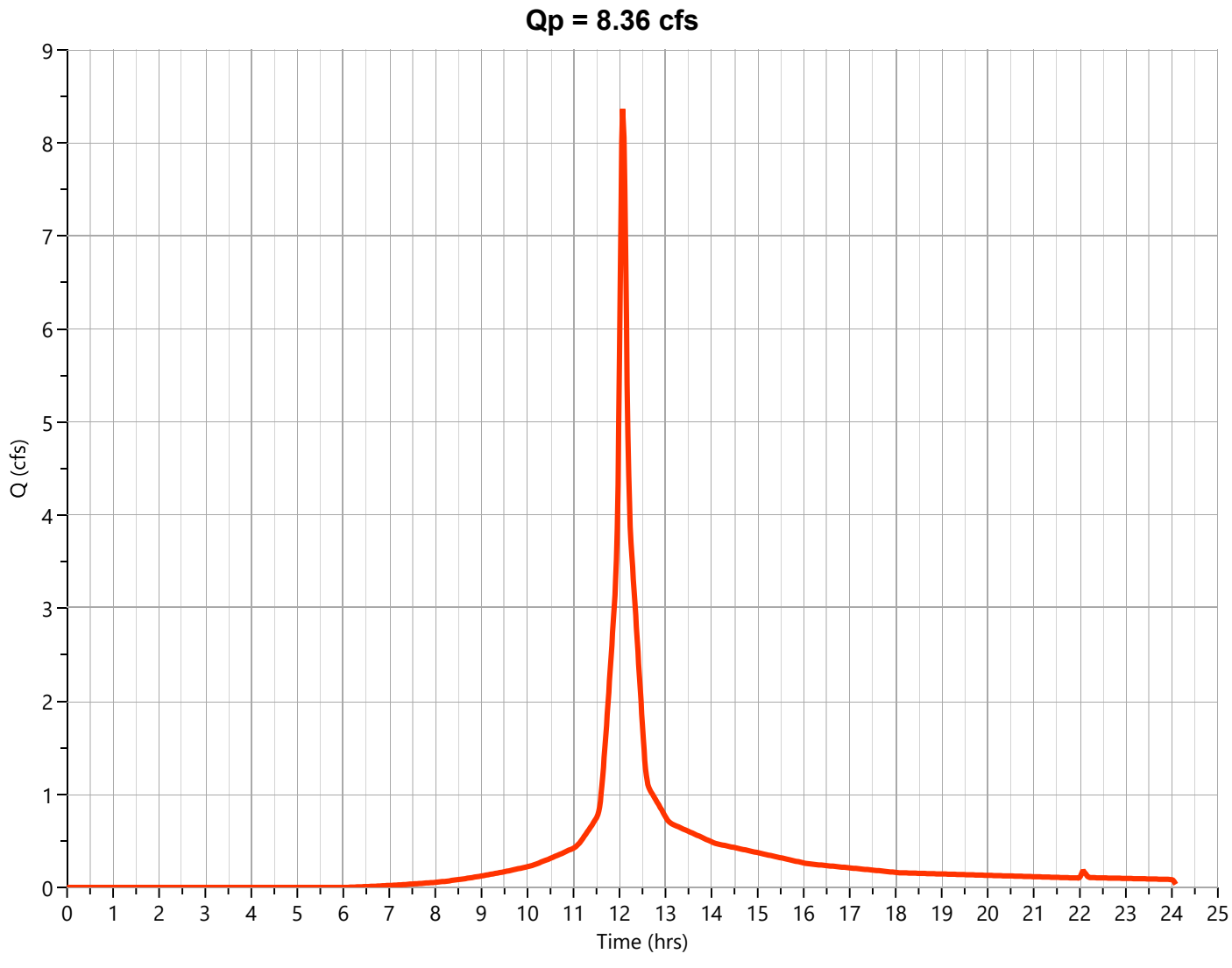
E1 - Ex. Conditions

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.365 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 26,126 cuft
Drainage Area	= 1.586 ac	Curve Number	= 81.2*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.54 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.257	98	Paved E1B, C, D
0.709	89	Millings E1A
0.579	63	Grass/Mulch E1F, G, H, J, K
0.041	98	Maint. Bldg. Roof E1E
1.586	**81**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

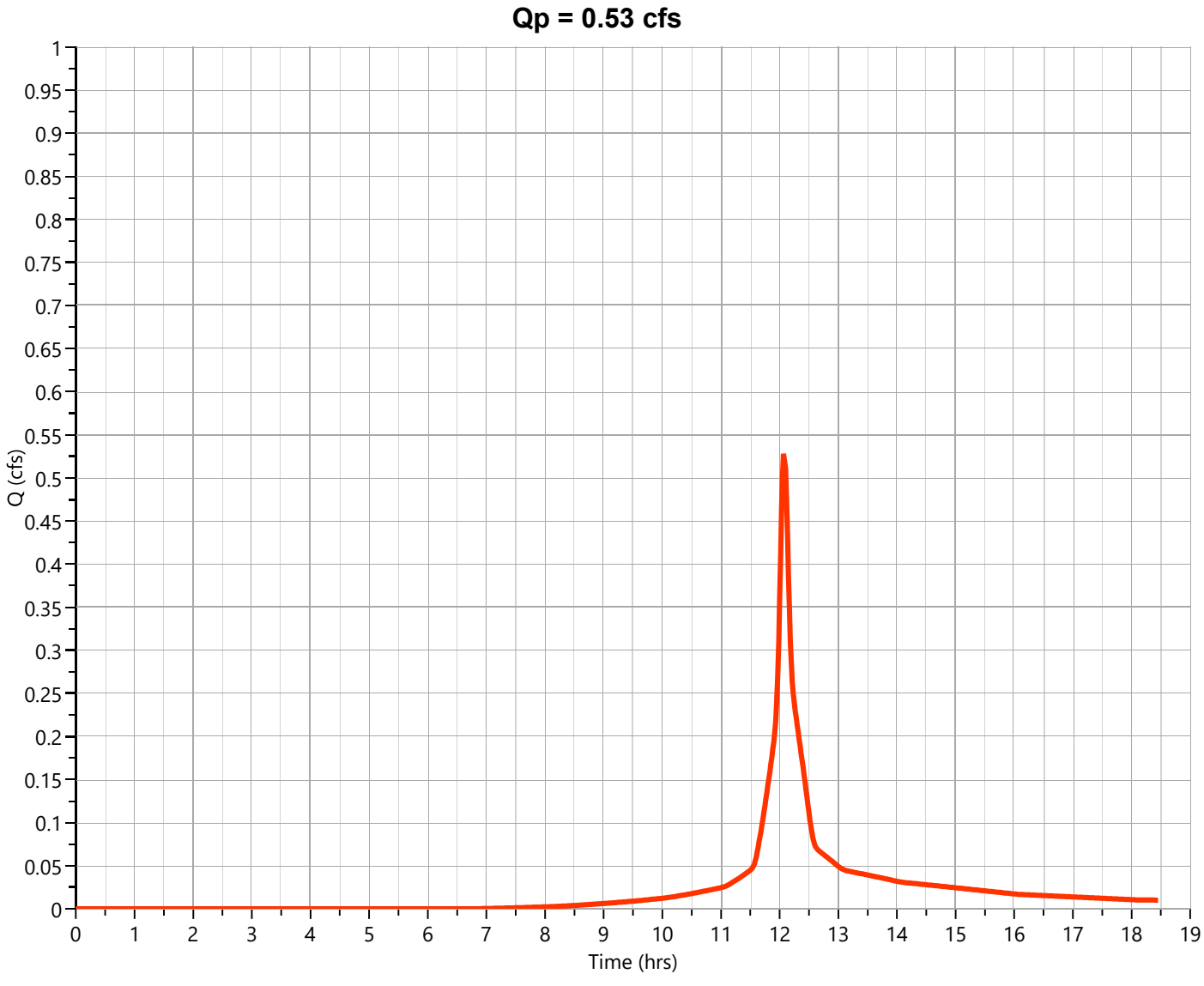
E2 - Ex. to Walbrid

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.529 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 1,640 cuft
Drainage Area	= 0.107 ac	Curve Number	= 78.34*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.54 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.034	89	Millings E2A
0.011	98	Pavement E2B
0.062	69	Grass/Mulch E2C
0.107	**78**	Weighted CN Method Employed



Hydrograph Report

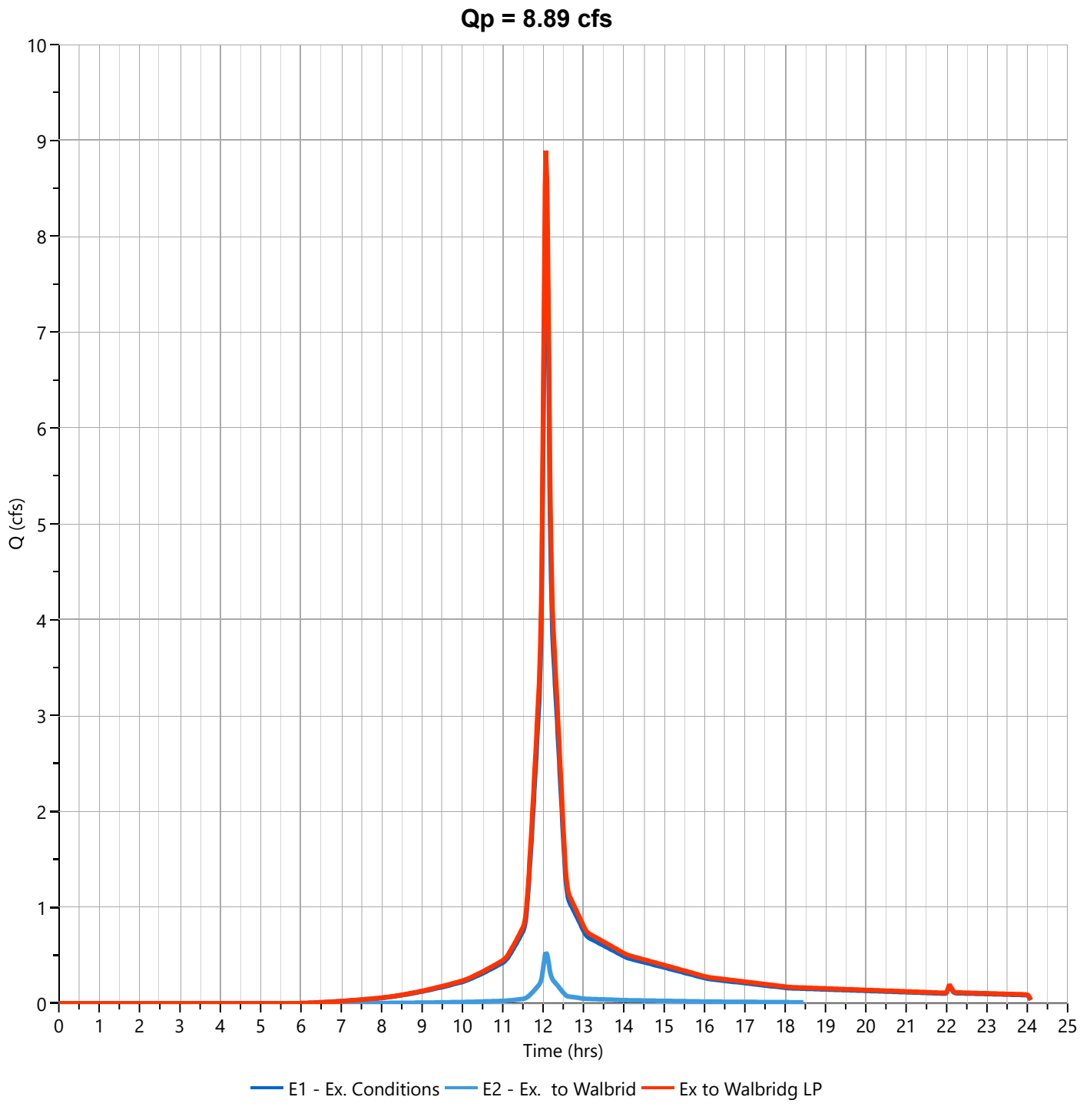
Hydrology Studio v 1.0.0.0

03-19-2020

Pre Ex to Walbridg LP

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 8.894 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Hydrograph Volume	= 27,766 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 1.693 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

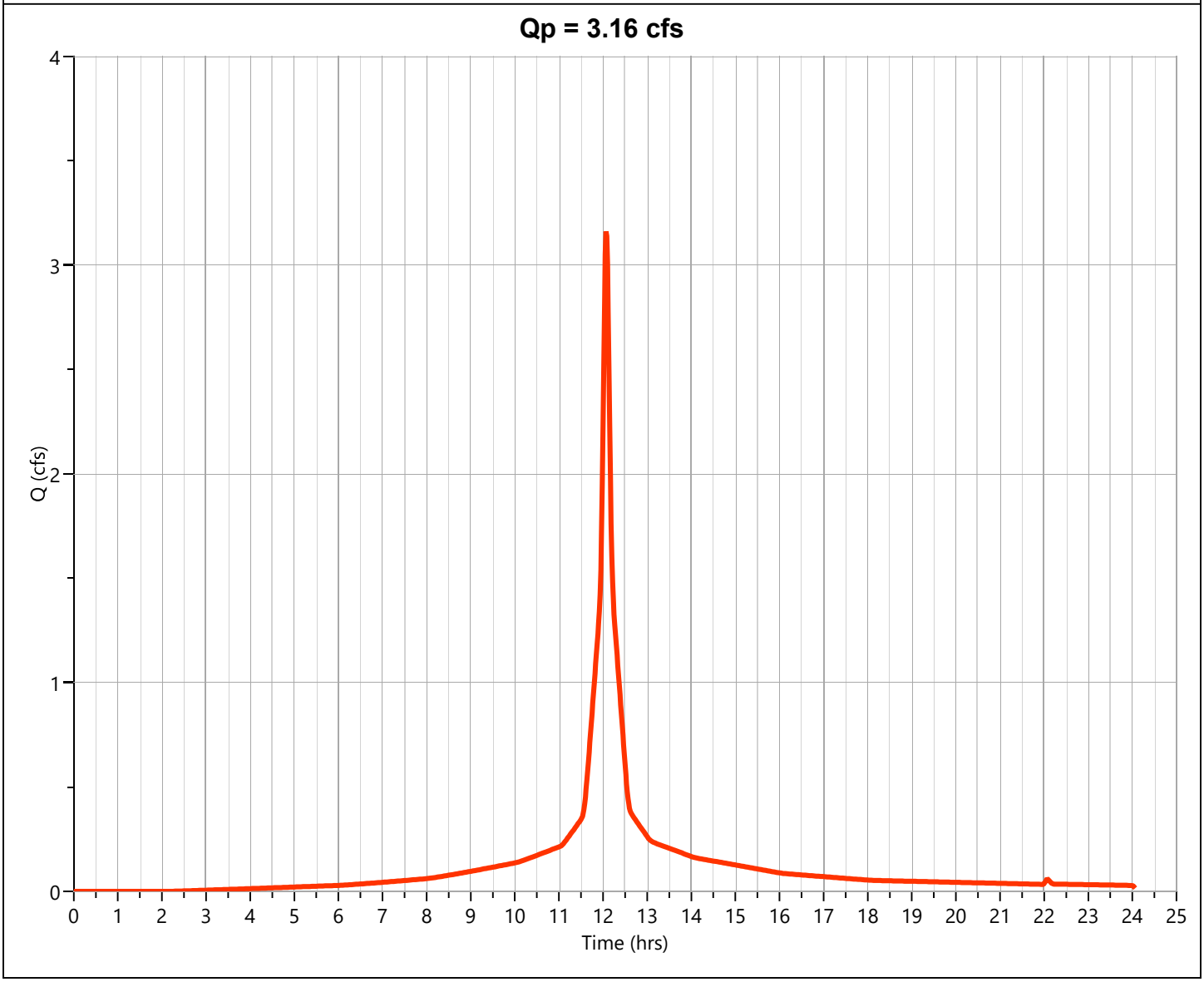
P1 - Maintenance Yd

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.161 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 10,625 cuft
Drainage Area	= 0.491 ac	Curve Number	= 93.56*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.54 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.43	98	P1A - Paved/Maint Bldg Roof
0.036	61	P1B - Grass
0.025	64	P1C - Landscaped Berm
0.491	**94**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

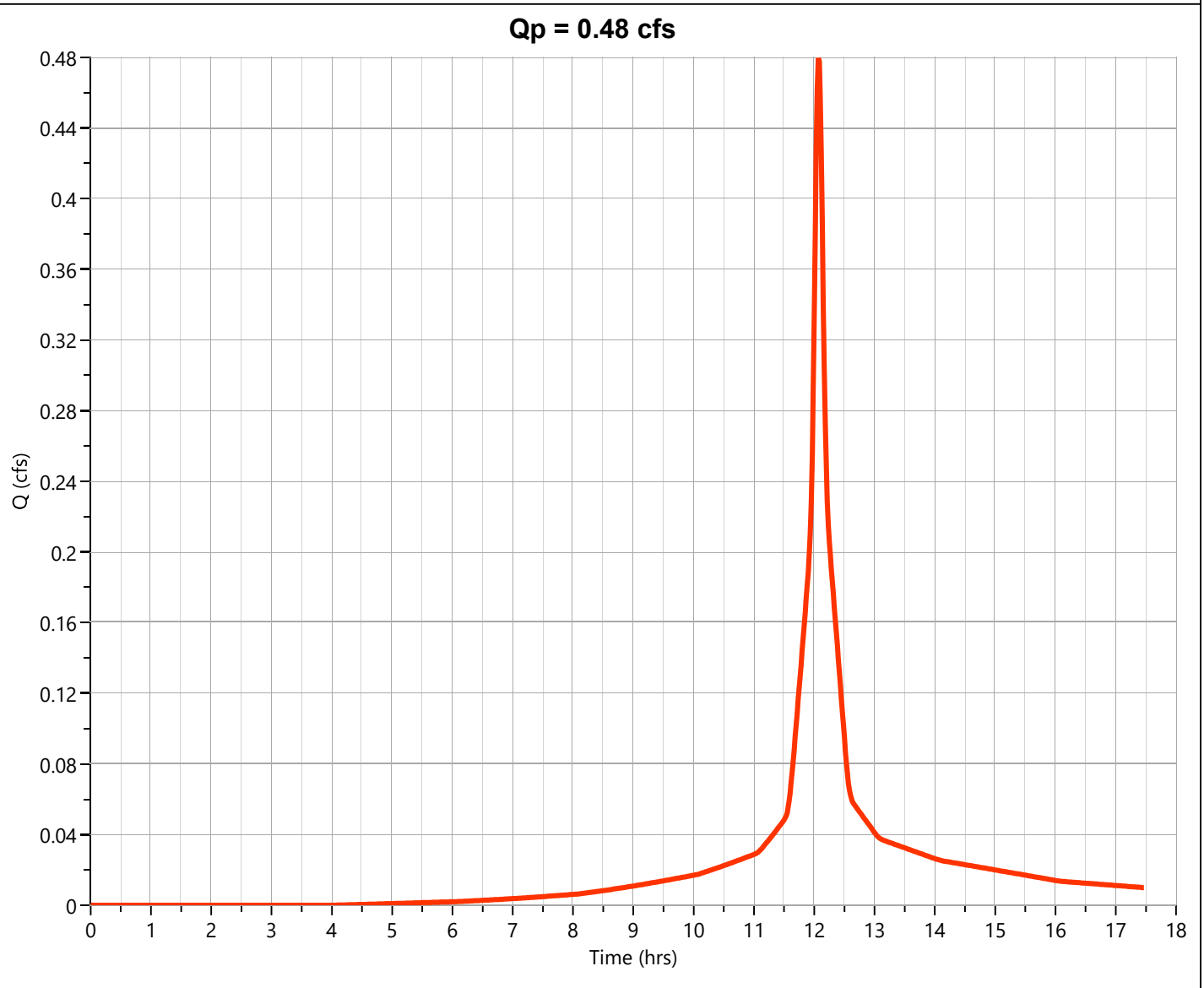
P2 - Upper walkways

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.479 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 1,541 cuft
Drainage Area	= 0.08 ac	Curve Number	= 88*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.54 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.065	62	P2C Grass
0.129	61	P2D, E, F, G, H Grass
0.12	64	P2J Grass/Mulch
0.08	**88**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

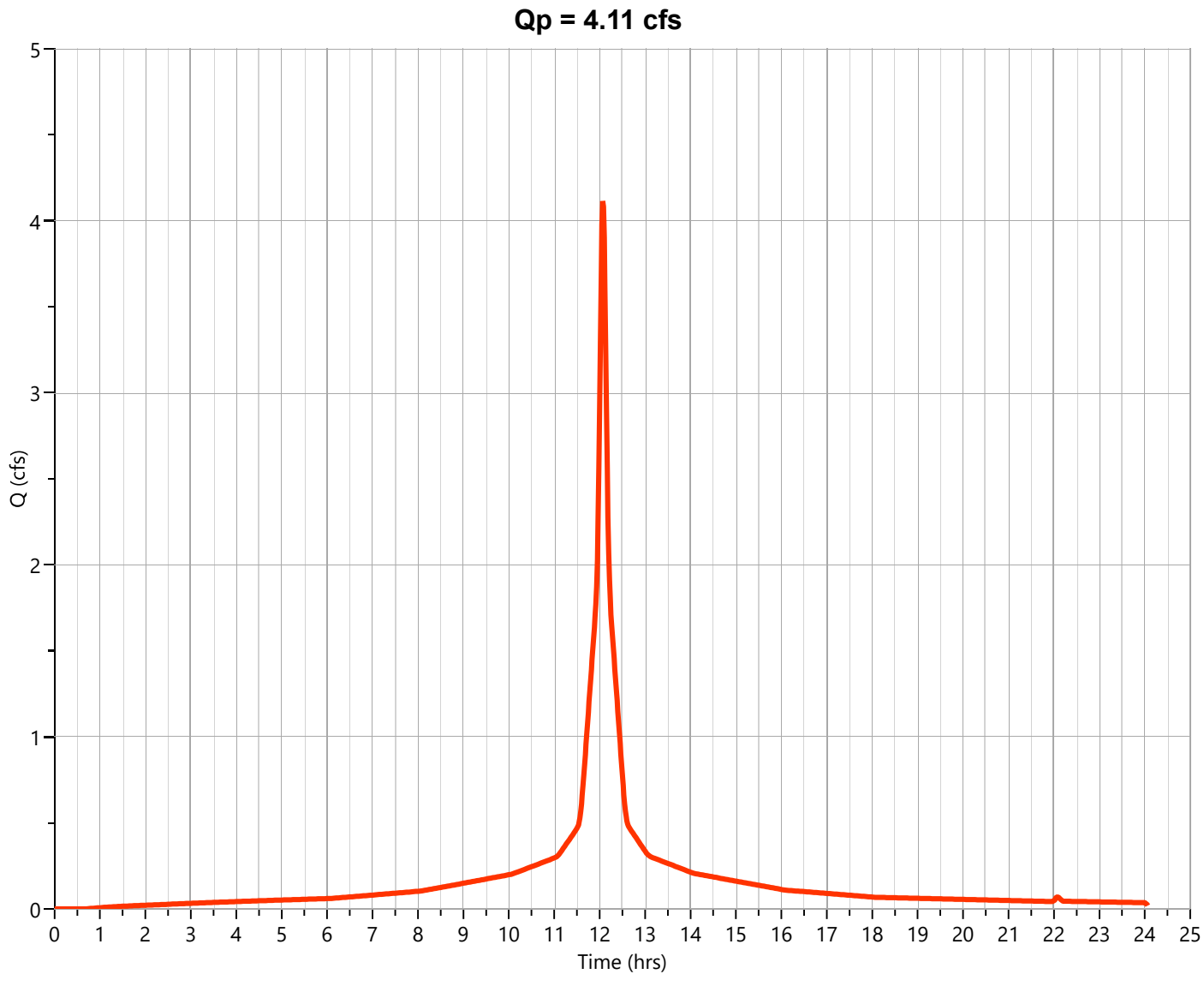
P2 - Parking Lot

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.114 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 14,625 cuft
Drainage Area	= 0.62 ac	Curve Number	= 98*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.54 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.537	98	P2A - Impervious
0.084	98	P2B - Impervious
0.62	**98**	Weighted CN Method Employed



Hydrograph Report

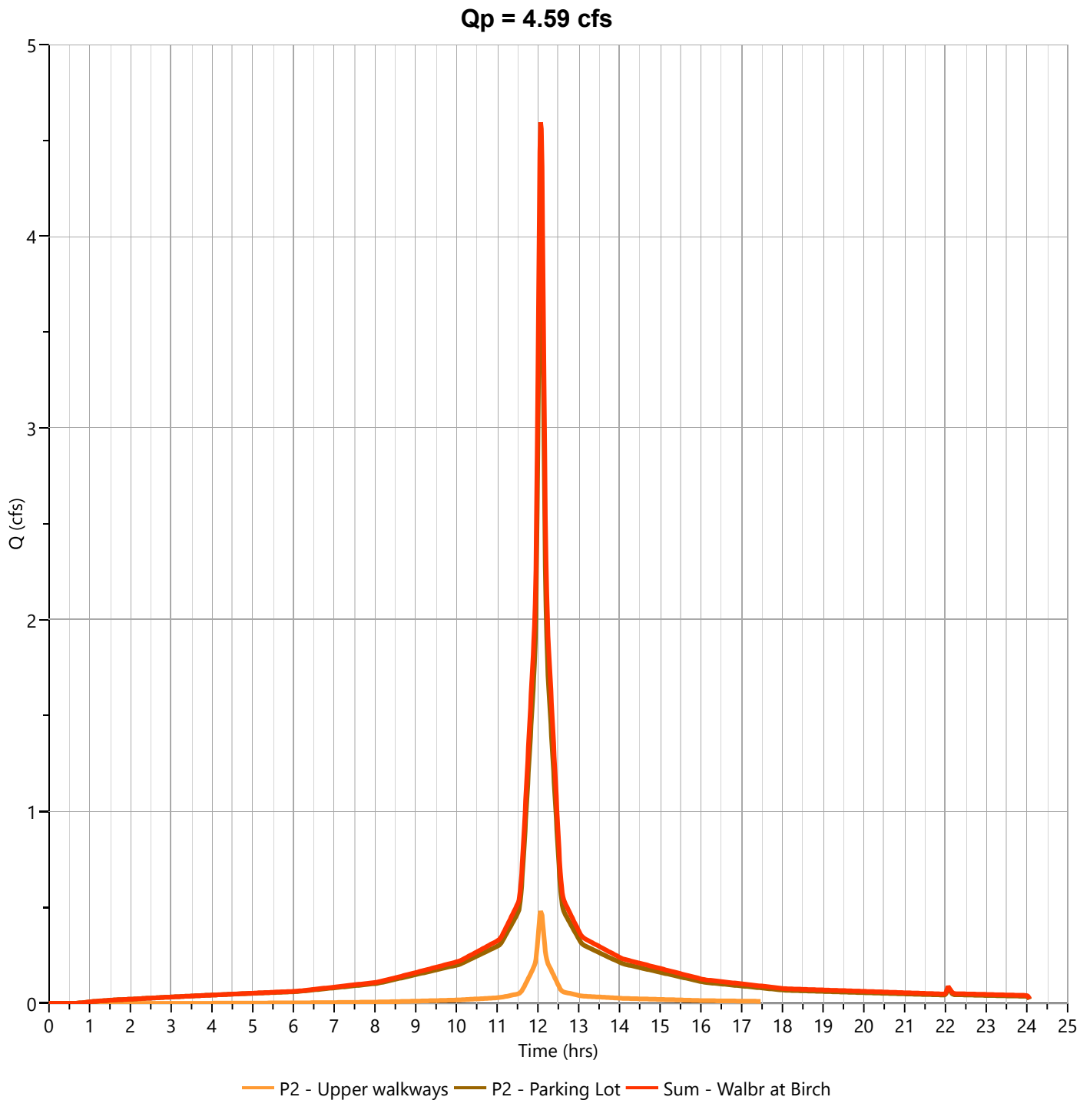
Hydrology Studio v 1.0.0.0

03-19-2020

Sum - Walbr at Birch

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 4.594 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 16,166 cuft
Inflow Hydrographs	= 5, 6	Total Contrib. Area	= 0.7 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

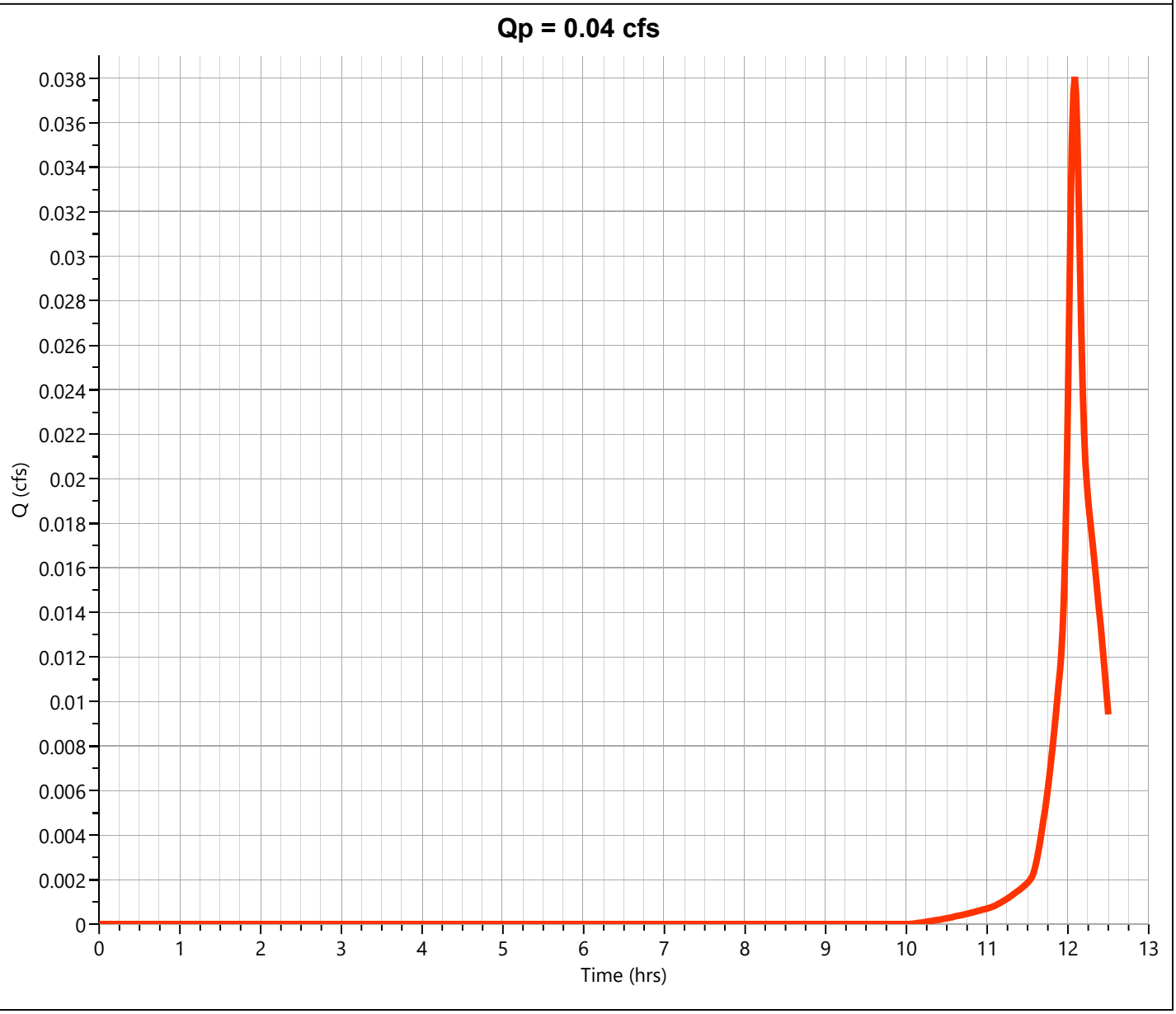
P3 - Walbridge West

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.038 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 120 cuft
Drainage Area	= 0.013 ac	Curve Number	= 62*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.54 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.013	62	P3A - Grass
0.013	**62**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

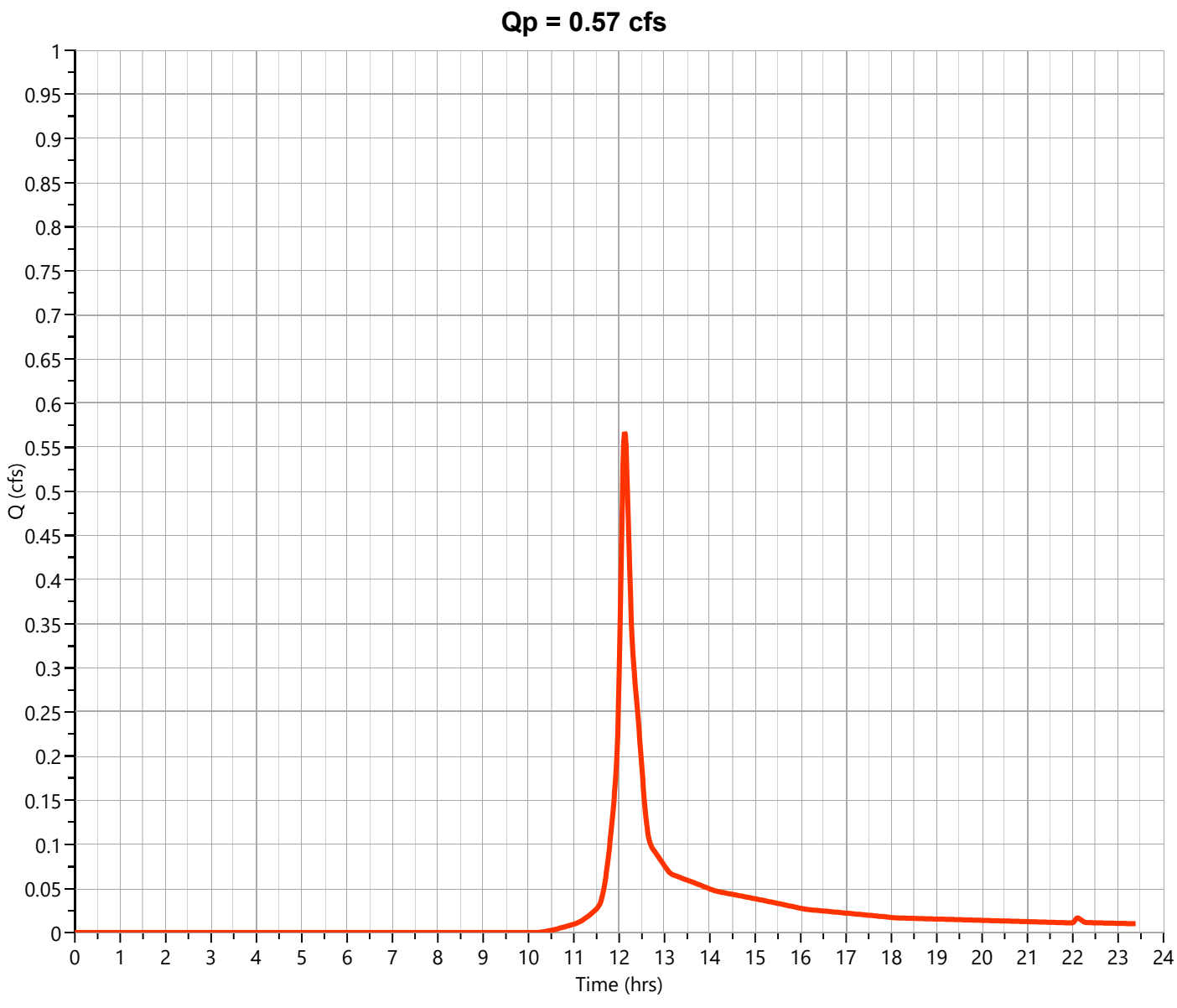
P4 - Area to WQB

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.567 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,009 cuft
Drainage Area	= 0.233 ac	Curve Number	= 61*
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 6.54 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.233	61	P4A - Pervious (grass/mulch)
0.233	**61**	Weighted CN Method Employed



Hydrograph Report

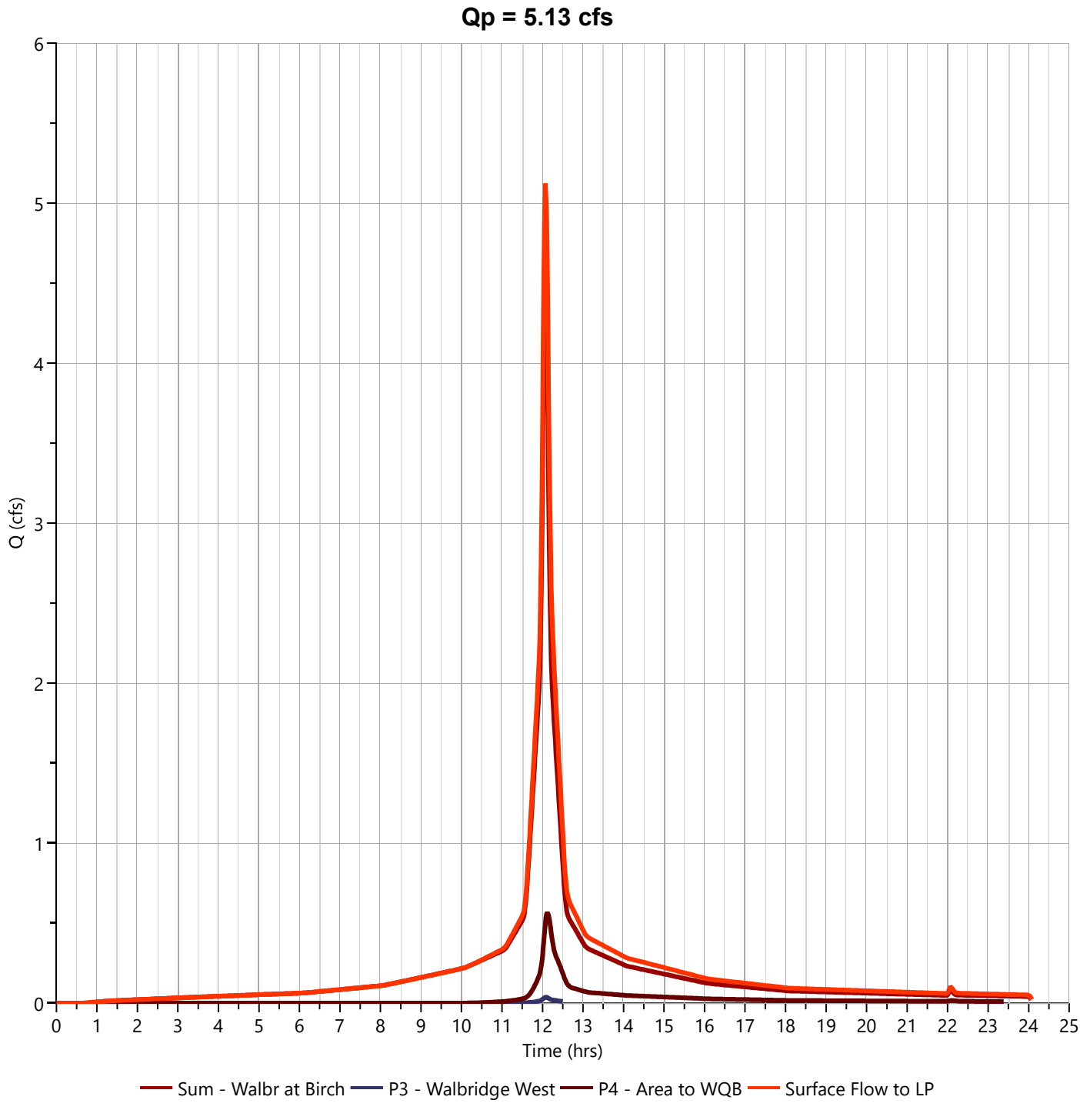
Hydrology Studio v 1.0.0.0

03-19-2020

Post Surface Flow to LP

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 5.128 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Hydrograph Volume	= 18,295 cuft
Inflow Hydrographs	= 7, 8, 9	Total Contrib. Area	= 0.946 ac



Hydrograph Report

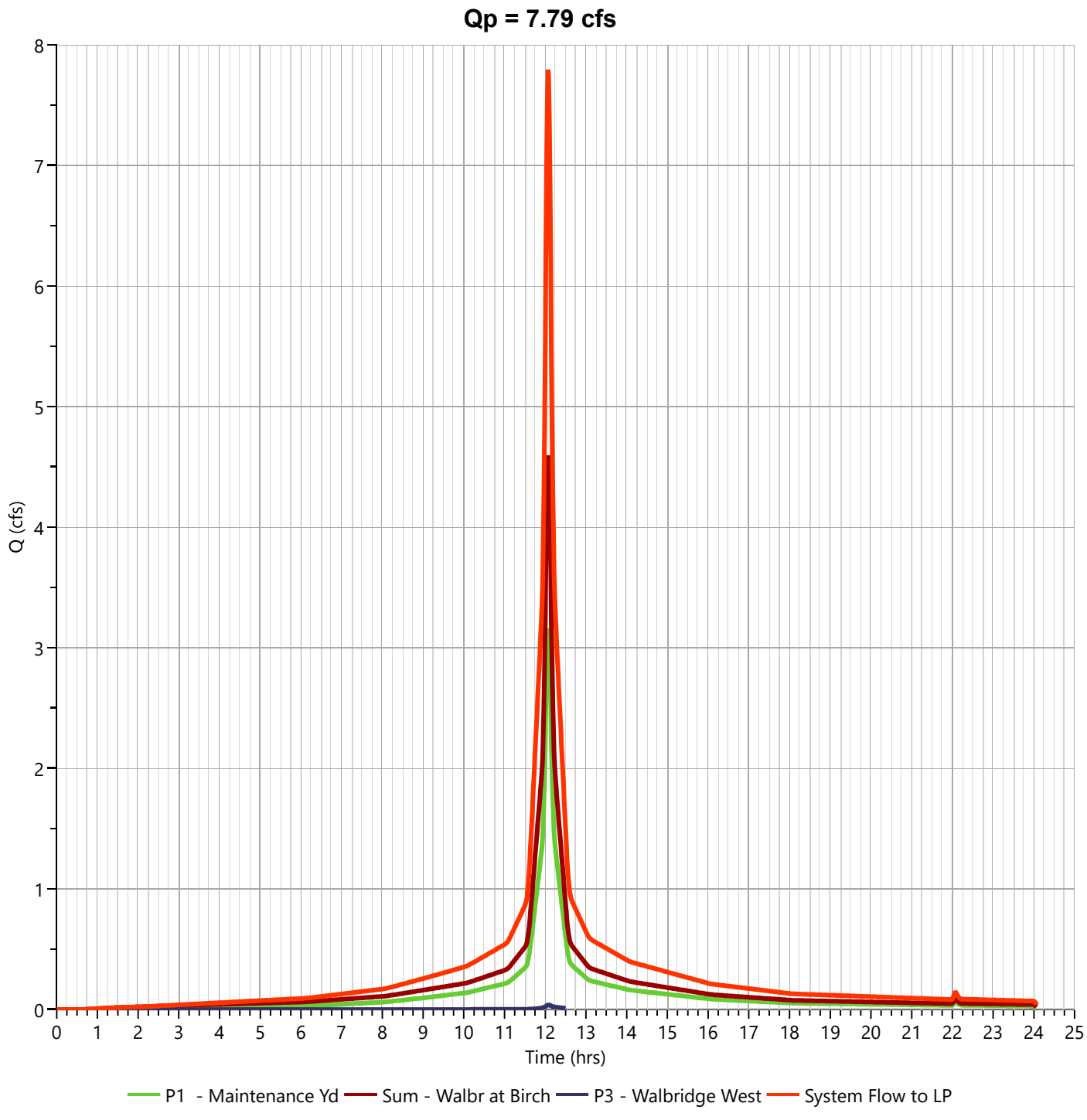
Hydrology Studio v 1.0.0.0

03-19-2020

Post System Flow to LP

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 7.792 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 26,912 cuft
Inflow Hydrographs	= 4, 7, 8	Total Contrib. Area	= 1.204 ac



Design Storm Report

Custom Storm filename: Bridgeport - 24 HR.cds

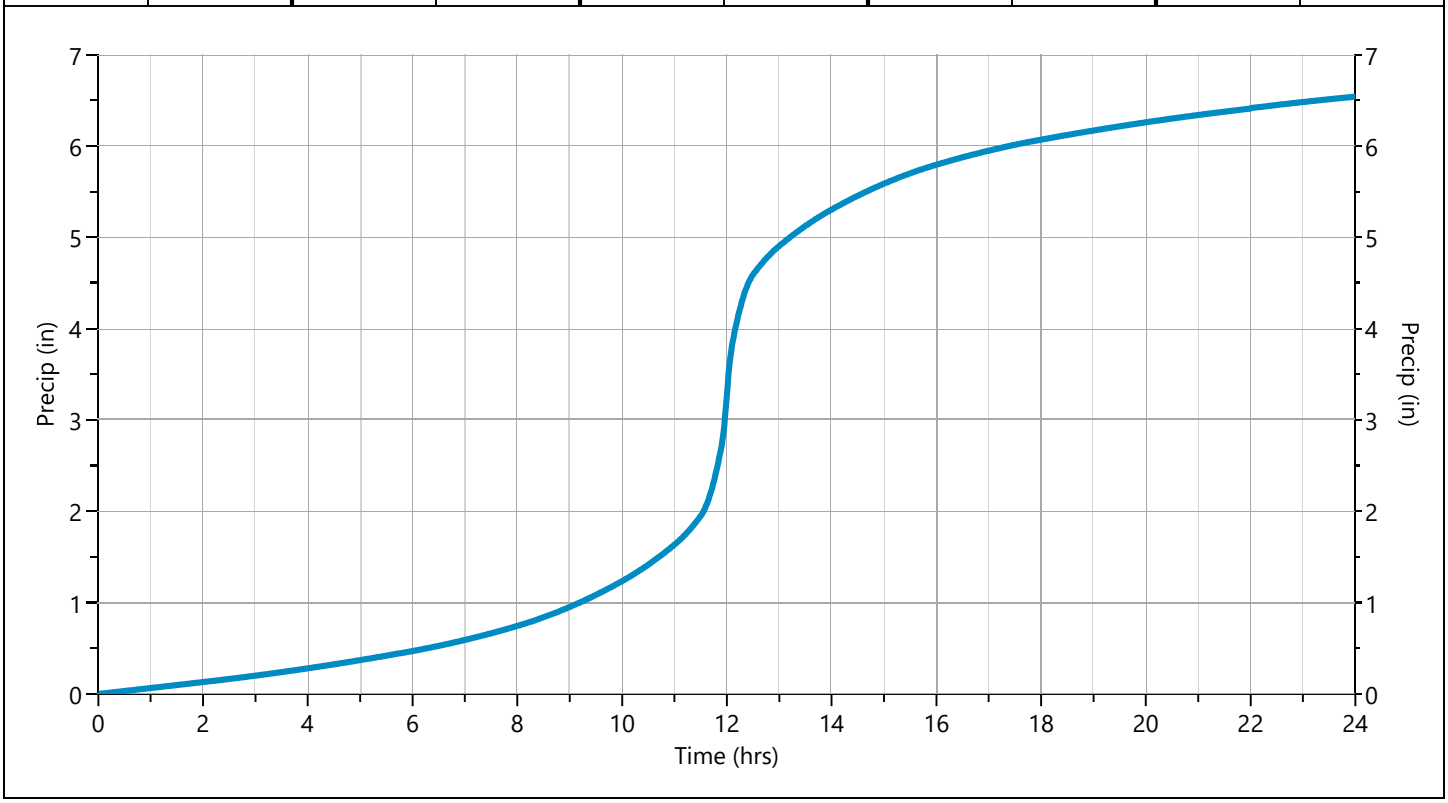
Hydrology Studio v 1.0.0.0

03-19-2020

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	5-yr	10-yr	✔ 25-yr	50-yr	100-yr	
24 hrs	2.64	3.30	0.00	4.39	5.30	6.54	7.50	8.46	

Incremental Rainfall Distribution, 25-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.50	0.012887	11.68	0.029757	11.87	0.047342	12.05	0.098263	12.23	0.039349
11.52	0.013733	11.70	0.031356	11.88	0.048941	12.07	0.084856	12.25	0.037750
11.53	0.015369	11.72	0.032954	11.90	0.050539	12.08	0.071449	12.27	0.036152
11.55	0.016968	11.73	0.034553	11.92	0.058229	12.10	0.058042	12.28	0.034553
11.57	0.018566	11.75	0.036152	11.93	0.071450	12.12	0.050731	12.30	0.032954
11.58	0.020165	11.77	0.037750	11.95	0.084857	12.13	0.048941	12.32	0.031356
11.60	0.021764	11.78	0.039349	11.97	0.098264	12.15	0.047342	12.33	0.029757
11.62	0.023362	11.80	0.040947	11.98	0.111671	12.17	0.045744	12.35	0.028158
11.63	0.024961	11.82	0.042547	**12.00**	**0.125078**	12.18	0.044145	12.37	0.026560
11.65	0.026560	11.83	0.044145	12.02	0.124778	12.20	0.042546	12.38	0.024961
11.67	0.028158	11.85	0.045743	12.03	0.111670	12.22	0.040948	12.40	0.023363



Hydrograph 50-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	10.00	12.07	31,436	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.639	12.08	1,990	----		
3	Junction	Pre Ex to Walbridg LP	10.64	12.07	33,426	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	3.651	12.07	12,375	----		
5	NRCS Runoff	P2 - Upper walkways	0.561	12.07	1,821	----		
6	NRCS Runoff	P2 - Parking Lot	4.722	12.07	16,851	----		
7	Junction	Sum - Walbr at Birch	5.283	12.07	18,672	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.050	12.08	154	----		
9	NRCS Runoff	P4 - Area to WQB	0.745	12.12	2,595	----		
10	Junction	Post Surface Flow to LP	5.995	12.08	21,422	7, 8, 9		
11	Junction	Post System Flow to LP	8.983	12.07	31,202	4, 7, 8		

Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

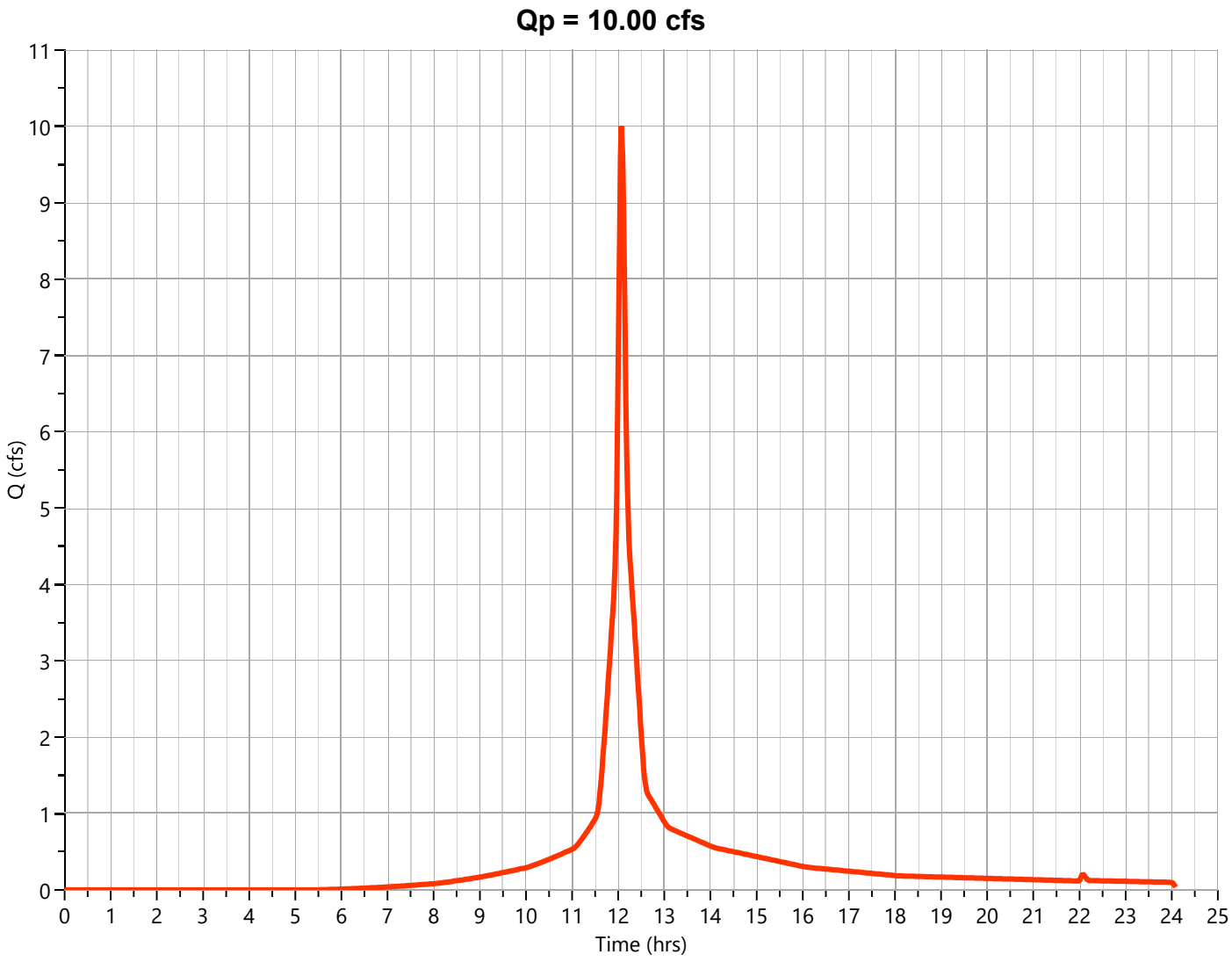
E1 - Ex. Conditions

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 10.00 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 31,436 cuft
Drainage Area	= 1.586 ac	Curve Number	= 81.2*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 7.50 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.257	98	Paved E1B, C, D
0.709	89	Millings E1A
0.579	63	Grass/Mulch E1F, G, H, J, K
0.041	98	Maint. Bldg. Roof E1E
1.586	**81**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

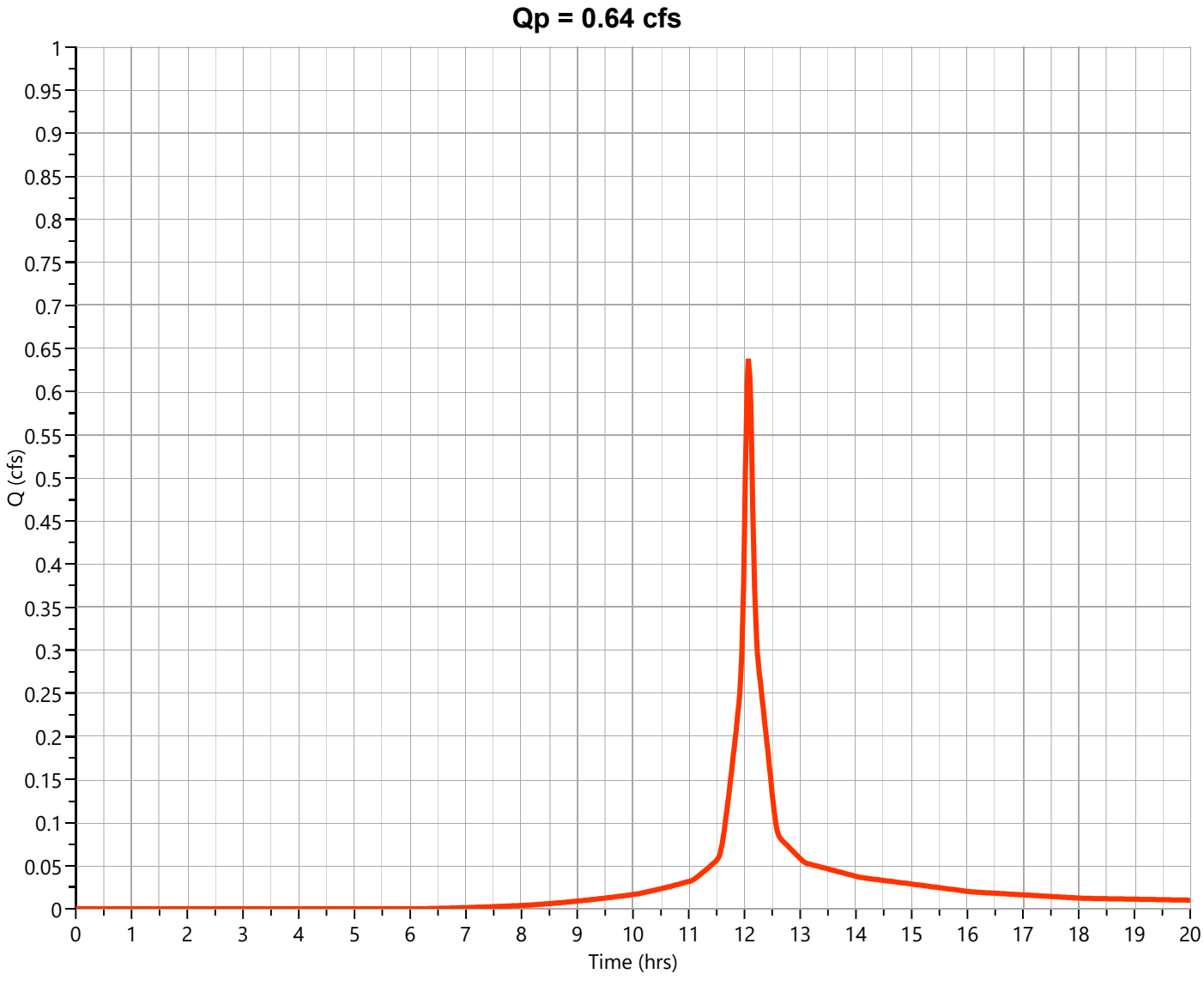
E2 - Ex. to Walbrid

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.639 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 1,990 cuft
Drainage Area	= 0.107 ac	Curve Number	= 78.34*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 7.50 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.034	89	Millings E2A
0.011	98	Pavement E2B
0.062	69	Grass/Mulch E2C
0.107	**78**	Weighted CN Method Employed



Hydrograph Report

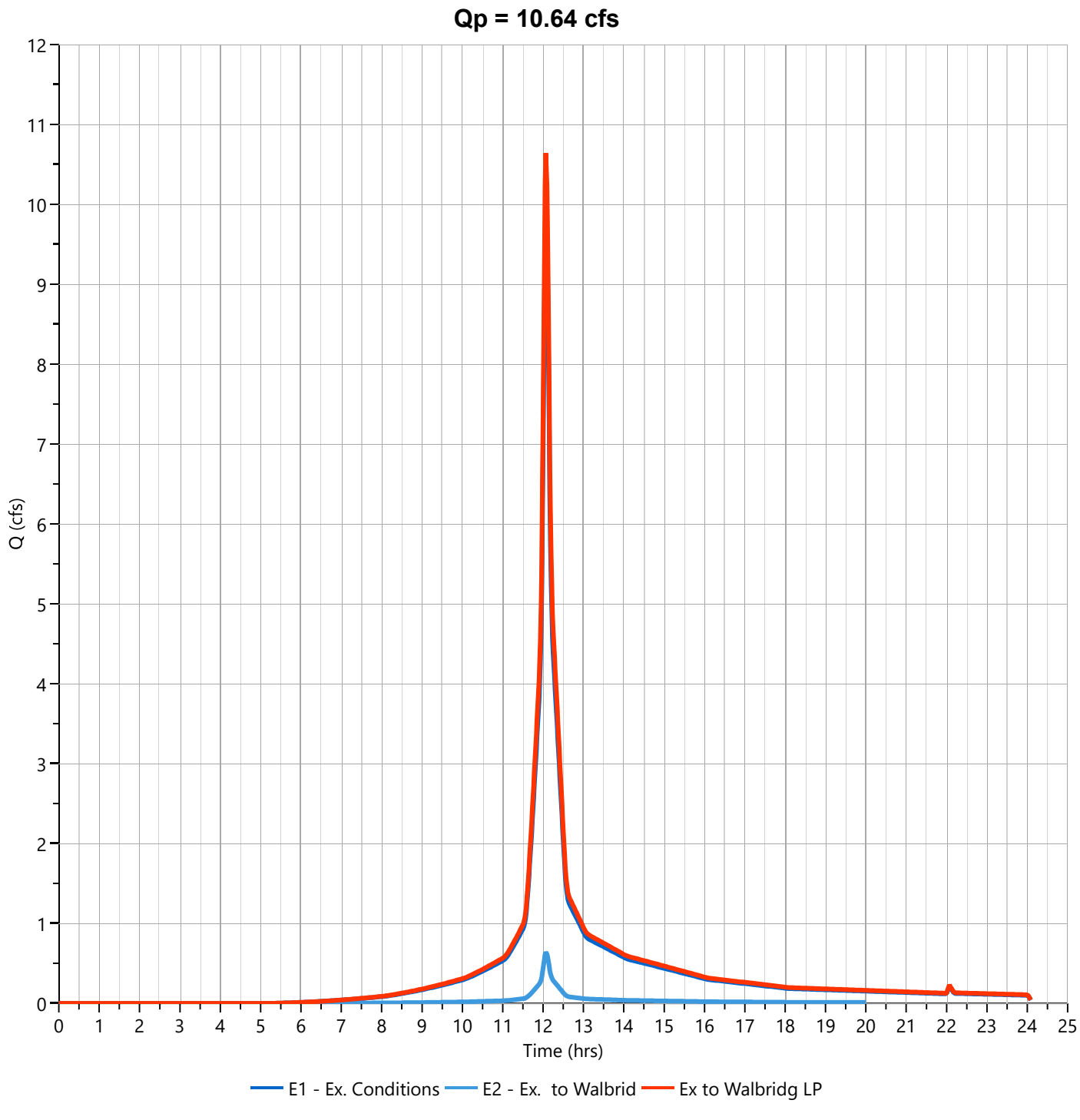
Hydrology Studio v 1.0.0.0

03-19-2020

Pre Ex to Walbridg LP

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 10.64 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 33,426 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 1.693 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

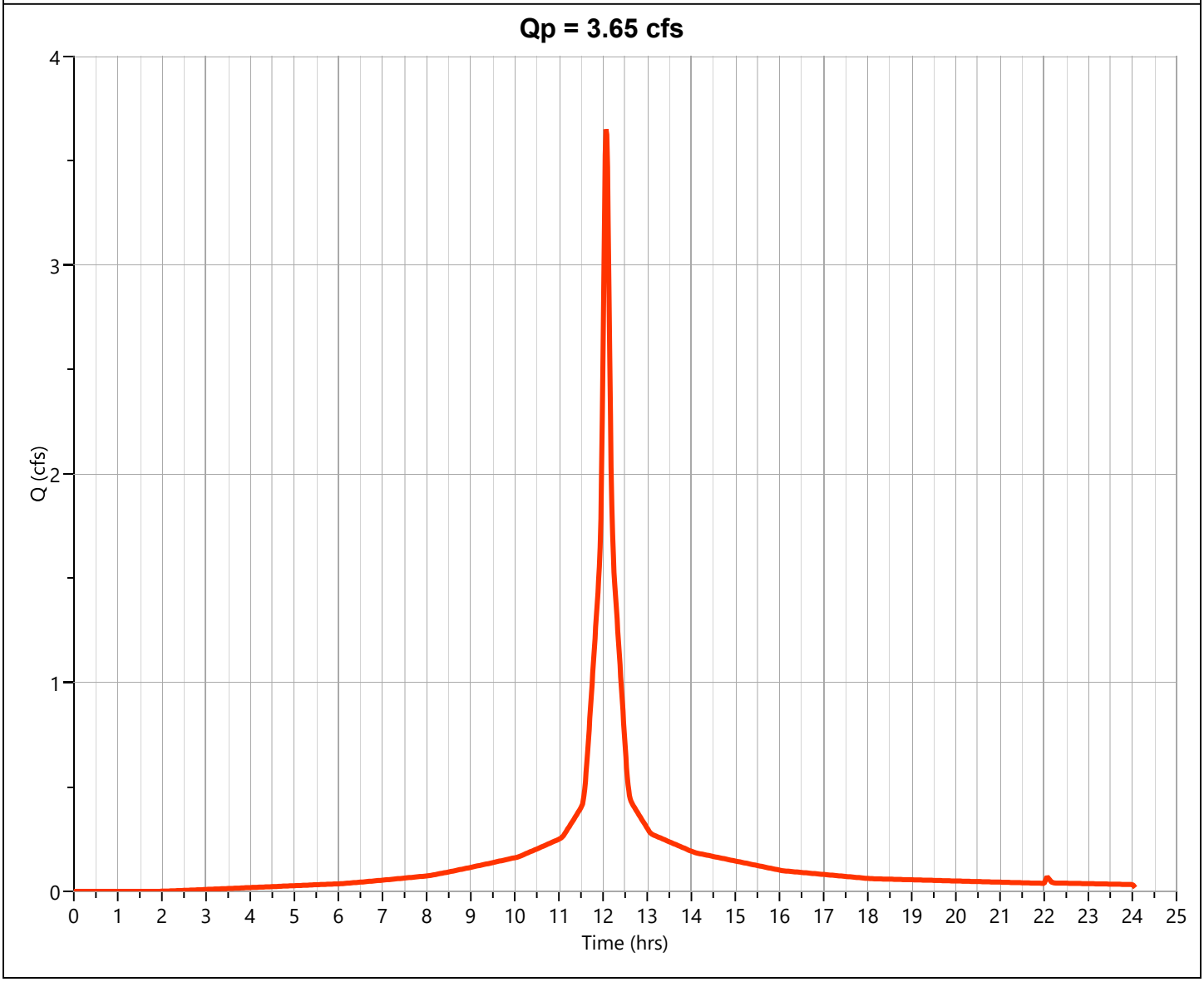
P1 - Maintenance Yd

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.651 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 12,375 cuft
Drainage Area	= 0.491 ac	Curve Number	= 93.56*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 7.50 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.43	98	P1A - Paved/Maint Bldg Roof
0.036	61	P1B - Grass
0.025	64	P1C - Landscaped Berm
0.491	**94**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

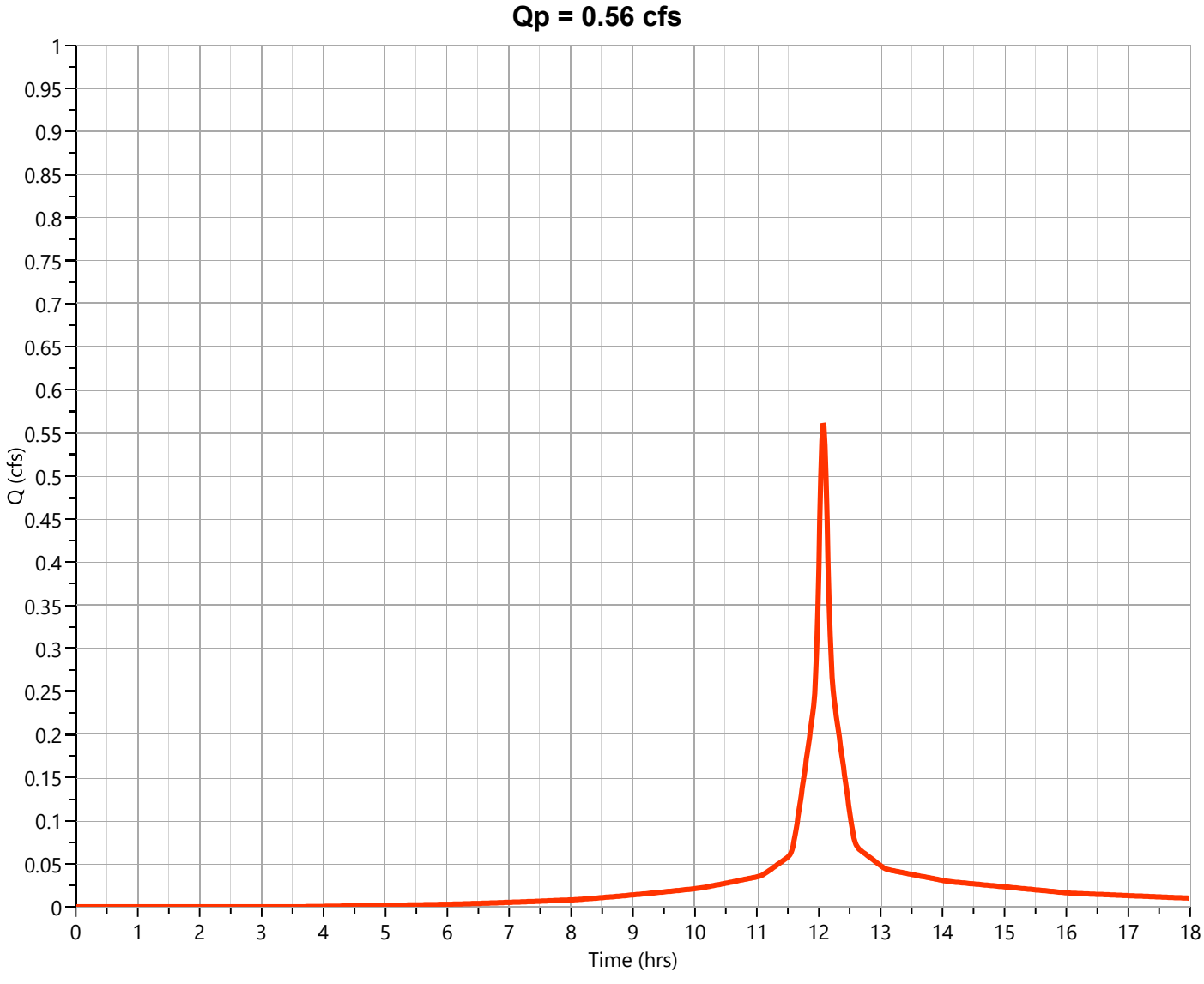
P2 - Upper walkways

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.561 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 1,821 cuft
Drainage Area	= 0.08 ac	Curve Number	= 88*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 7.50 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.065	62	P2C Grass
0.129	61	P2D, E, F, G, H Grass
0.12	64	P2J Grass/Mulch
0.08	**88**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

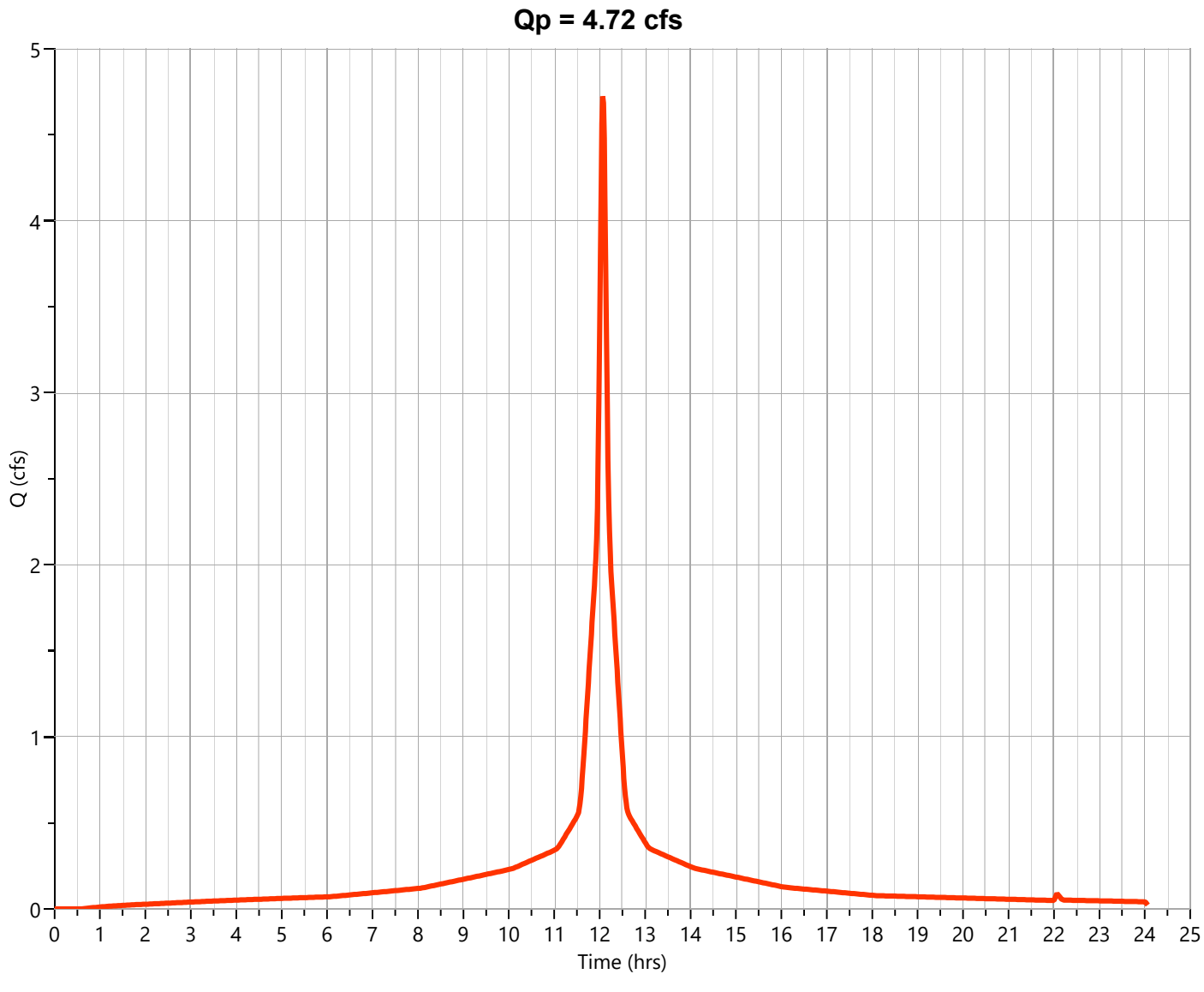
P2 - Parking Lot

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.722 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 16,851 cuft
Drainage Area	= 0.62 ac	Curve Number	= 98*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 7.50 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.537	98	P2A - Impervious
0.084	98	P2B - Impervious
0.62	**98**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

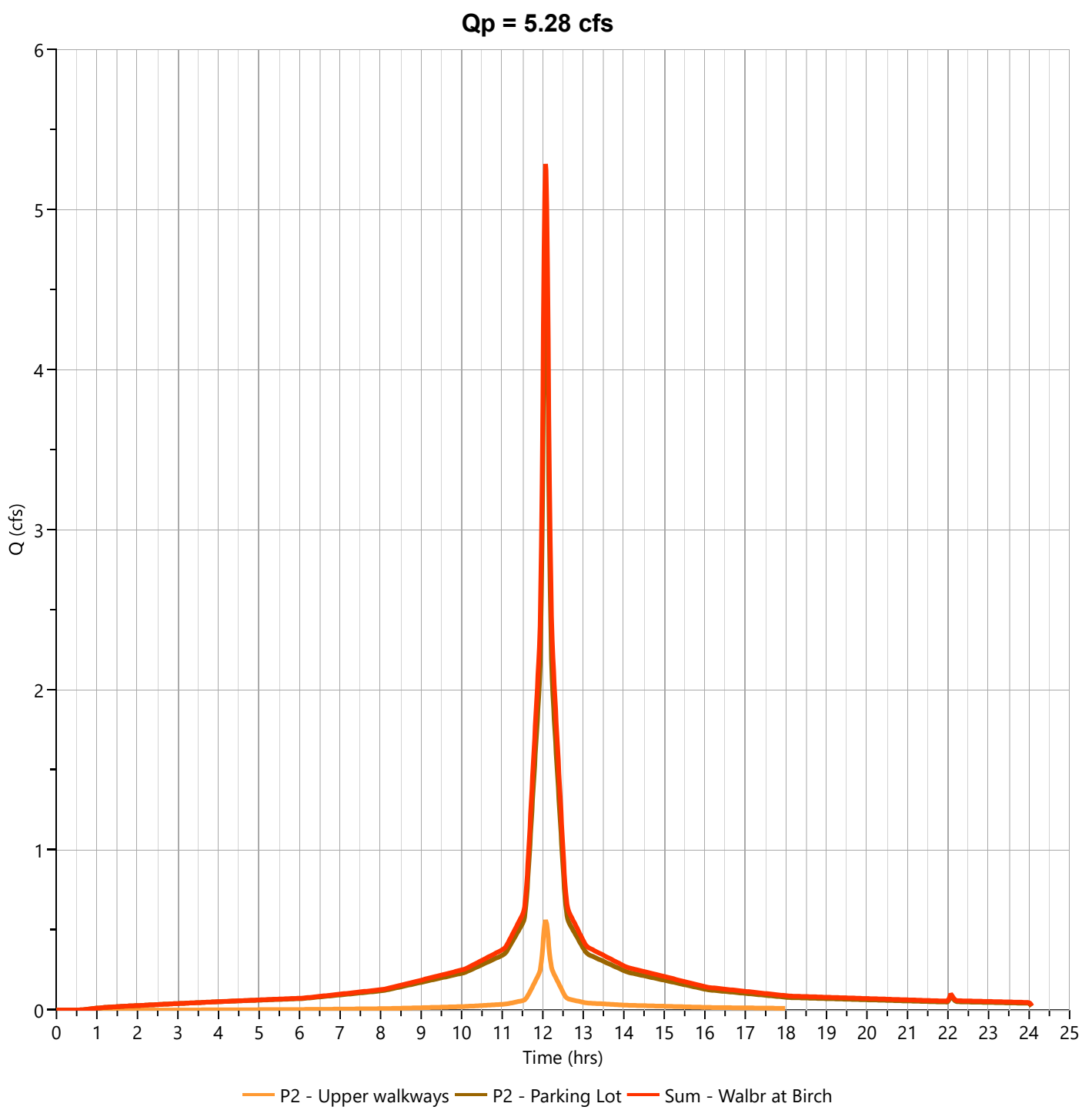
Hydrology Studio v 1.0.0.0

03-19-2020

Sum - Walbr at Birch

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 5.283 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 18,672 cuft
Inflow Hydrographs	= 5, 6	Total Contrib. Area	= 0.7 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

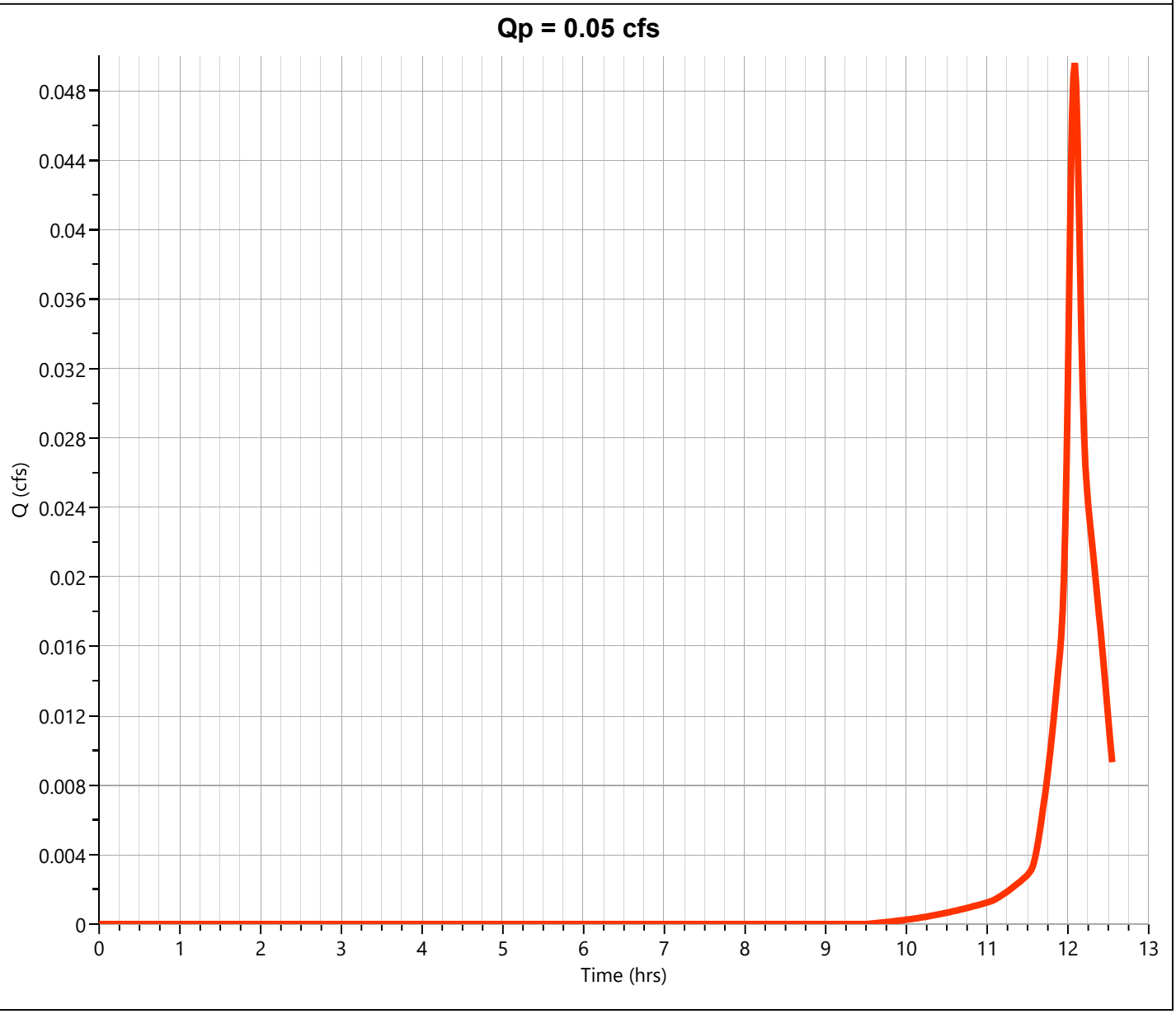
P3 - Walbridge West

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.050 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 154 cuft
Drainage Area	= 0.013 ac	Curve Number	= 62*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 7.50 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.013	62	P3A - Grass
0.013	**62**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

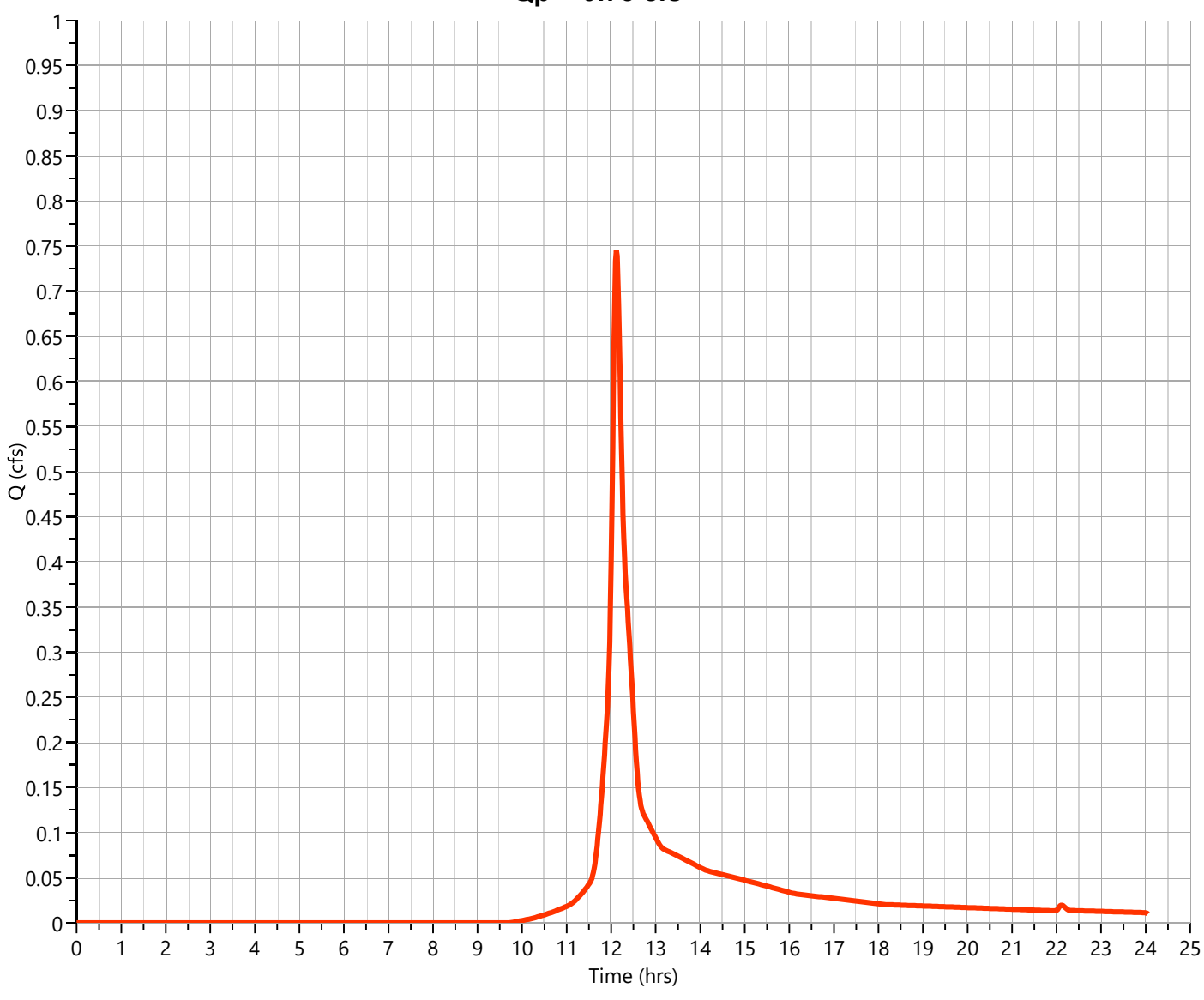
P4 - Area to WQB

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.745 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,595 cuft
Drainage Area	= 0.233 ac	Curve Number	= 61*
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 7.50 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.233	61	P4A - Pervious (grass/mulch)
0.233	**61**	Weighted CN Method Employed



Hydrograph Report

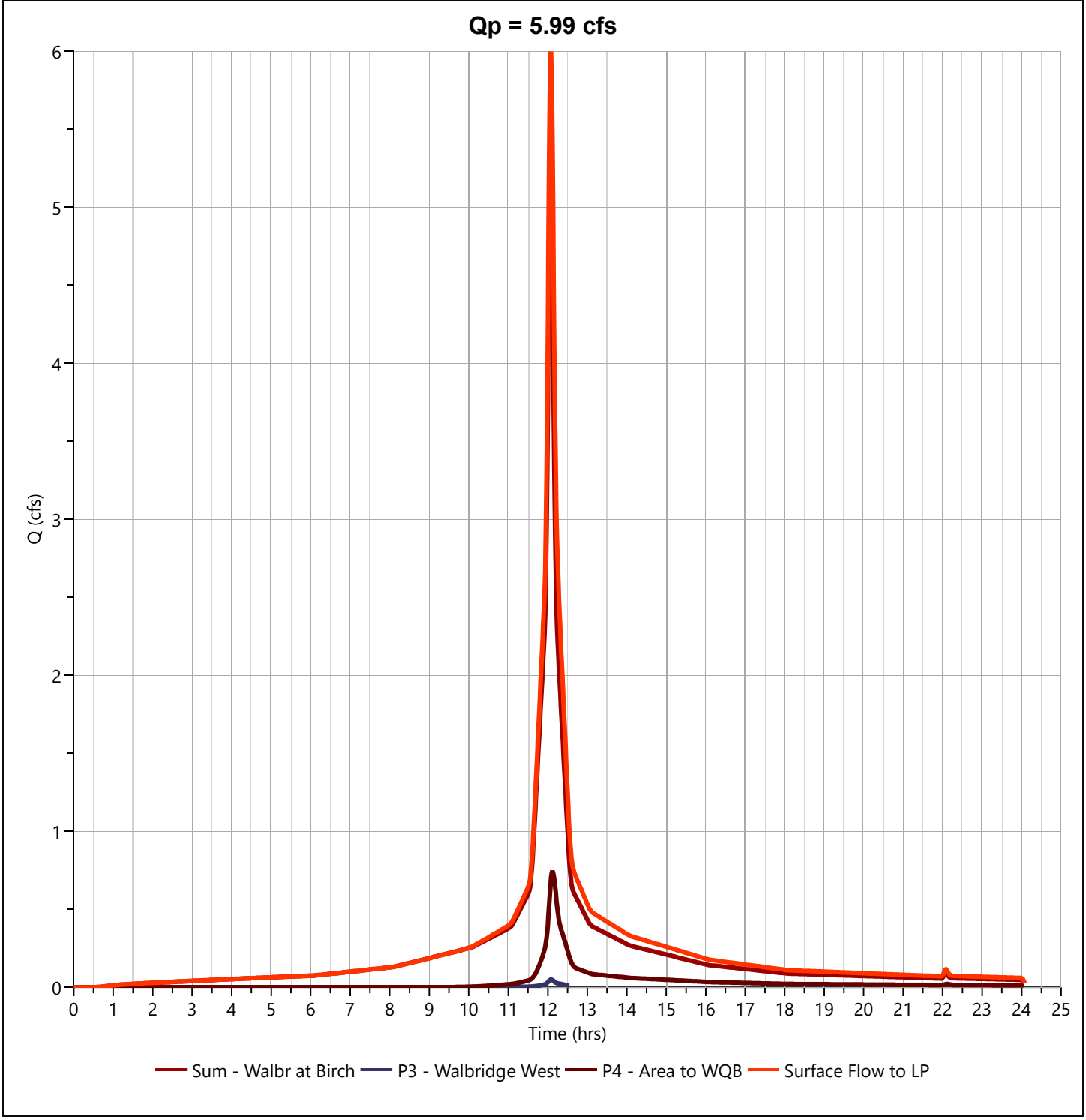
Hydrology Studio v 1.0.0.0

03-19-2020

Post Surface Flow to LP

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 5.995 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Hydrograph Volume	= 21,422 cuft
Inflow Hydrographs	= 7, 8, 9	Total Contrib. Area	= 0.946 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

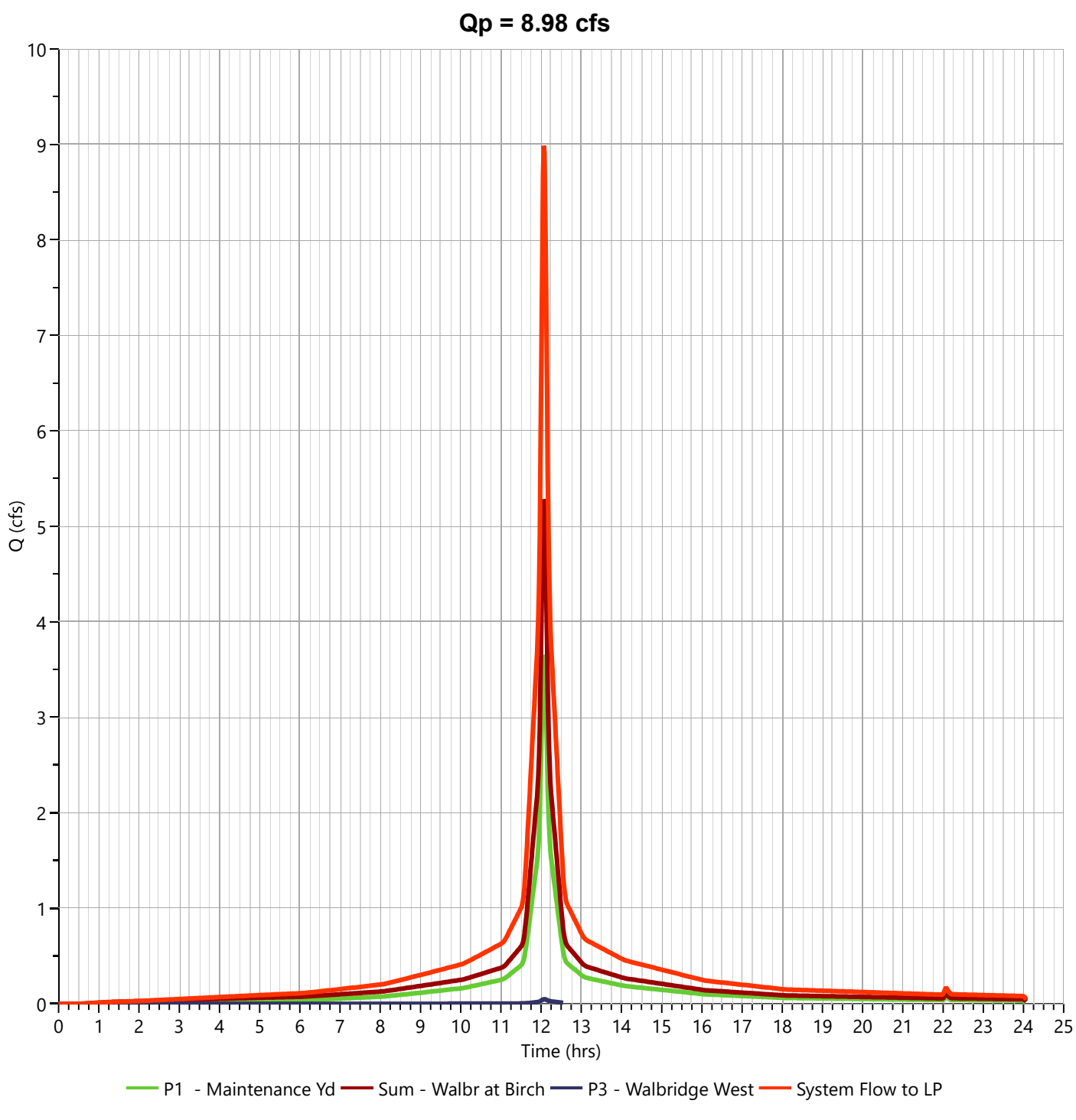
Hydrology Studio v 1.0.0.0

03-19-2020

Post System Flow to LP

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 8.983 cfs
Storm Frequency	= 50-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 31,202 cuft
Inflow Hydrographs	= 4, 7, 8	Total Contrib. Area	= 1.204 ac



Design Storm Report

Custom Storm filename: Bridgeport - 24 HR.cds

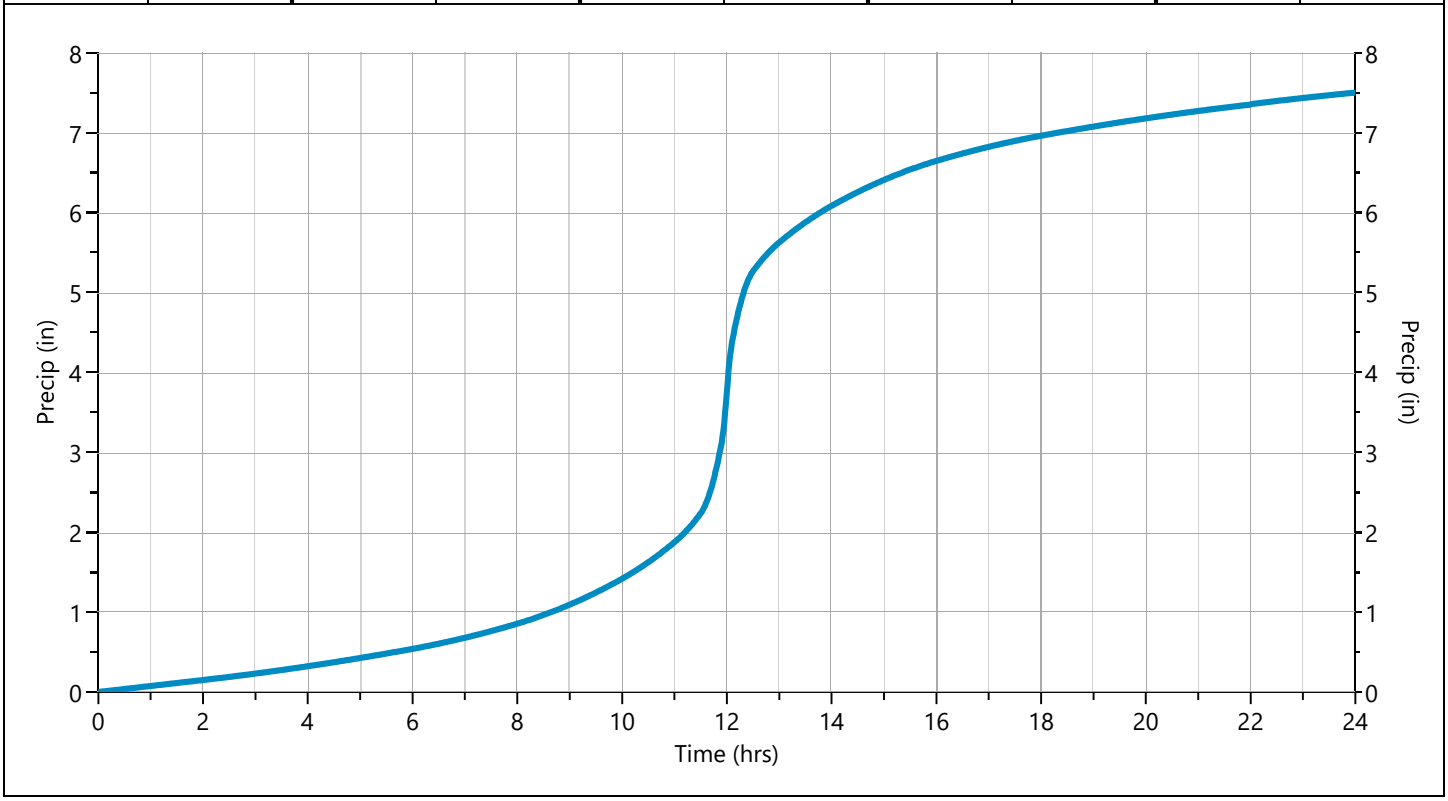
Hydrology Studio v 1.0.0.0

03-19-2020

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	✔ 50-yr	100-yr	
24 hrs	2.64	3.30	0.00	4.39	5.30	6.54	7.50	8.46	

Incremental Rainfall Distribution, 50-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.50	0.014779	11.68	0.034125	11.87	0.054292	12.05	0.112687	12.23	0.045125
11.52	0.015749	11.70	0.035958	11.88	0.056125	12.07	0.097312	12.25	0.043292
11.53	0.017625	11.72	0.037791	11.90	0.057958	12.08	0.081937	12.27	0.041458
11.55	0.019458	11.73	0.039625	11.92	0.066777	12.10	0.066562	12.28	0.039625
11.57	0.021292	11.75	0.041458	11.93	0.081938	12.12	0.058178	12.30	0.037792
11.58	0.023125	11.77	0.043292	11.95	0.097313	12.13	0.056125	12.32	0.035958
11.60	0.024958	11.78	0.045125	11.97	0.112688	12.15	0.054292	12.33	0.034125
11.62	0.026792	11.80	0.046958	11.98	0.128063	12.17	0.052458	12.35	0.032291
11.63	0.028625	11.82	0.048792	**12.00**	**0.143438**	12.18	0.050625	12.37	0.030458
11.65	0.030458	11.83	0.050625	12.02	0.143094	12.20	0.048791	12.38	0.028625
11.67	0.032291	11.85	0.052458	12.03	0.128062	12.22	0.046958	12.40	0.026792



Hydrograph 100-yr Summary

Project Name: Elizabeth Park Parking

03-19-2020

Hydrology Studio v 1.0.0.0

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	E1 - Ex. Conditions	11.64	12.07	36,819	----		
2	NRCS Runoff	E2 - Ex. to Walbrid	0.749	12.07	2,347	----		
3	Junction	Pre Ex to Walbridg LP	12.39	12.07	39,165	1, 2		
4	NRCS Runoff	P1 - Maintenance Yd	4.140	12.07	14,128	----		
5	NRCS Runoff	P2 - Upper walkways	0.643	12.07	2,102	----		
6	NRCS Runoff	P2 - Parking Lot	5.329	12.07	19,078	----		
7	Junction	Sum - Walbr at Birch	5.972	12.07	21,180	5, 6		
8	NRCS Runoff	P3 - Walbridge West	0.062	12.08	191	----		
9	NRCS Runoff	P4 - Area to WQB	0.931	12.12	3,213	----		
10	Junction	Post Surface Flow to LP	6.870	12.08	24,584	7, 8, 9		
11	Junction	Post System Flow to LP	10.17	12.07	35,498	4, 7, 8		

Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

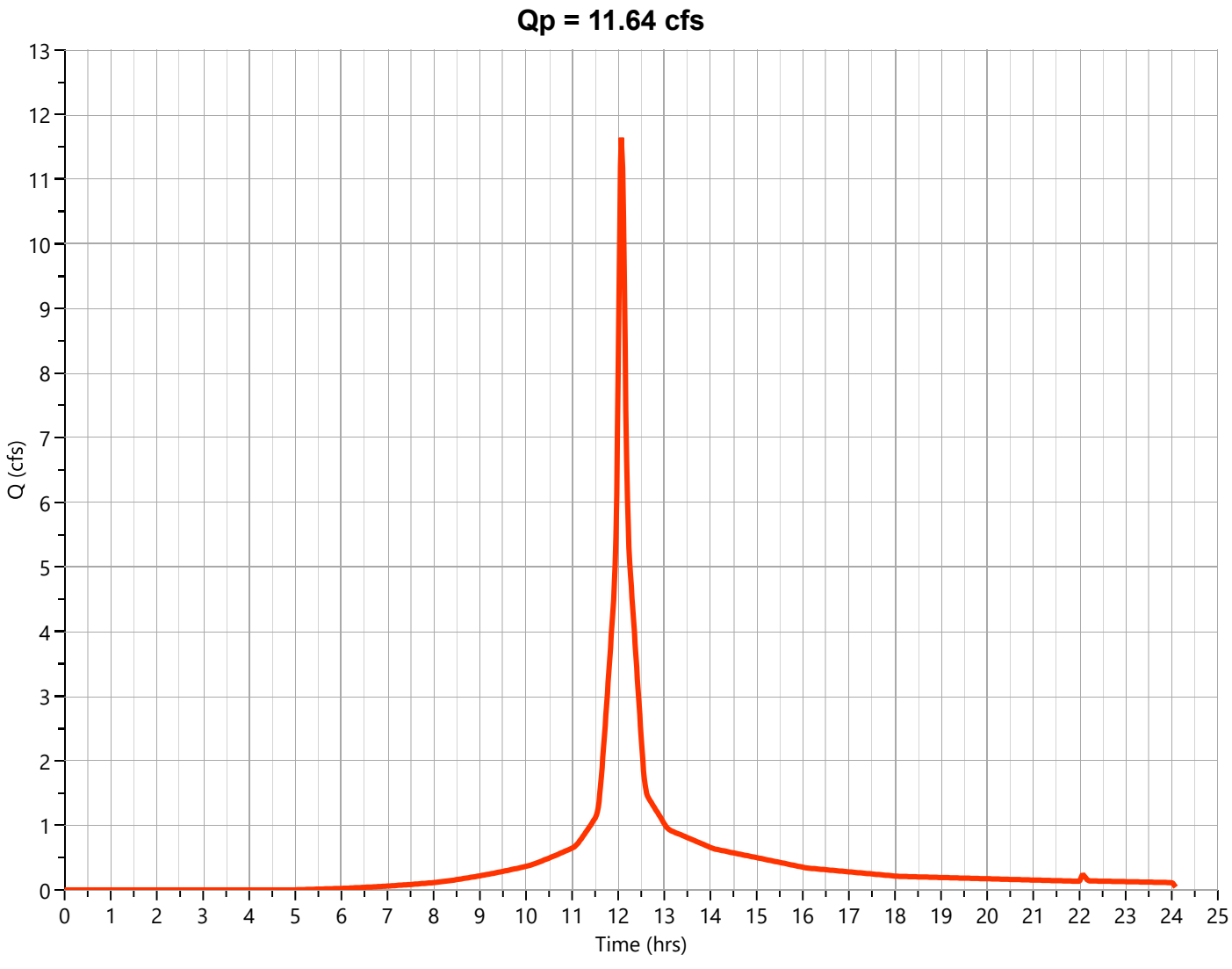
E1 - Ex. Conditions

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 11.64 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 36,819 cuft
Drainage Area	= 1.586 ac	Curve Number	= 81.2*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.46 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.257	98	Paved E1B, C, D
0.709	89	Millings E1A
0.579	63	Grass/Mulch E1F, G, H, J, K
0.041	98	Maint. Bldg. Roof E1E
1.586	**81**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

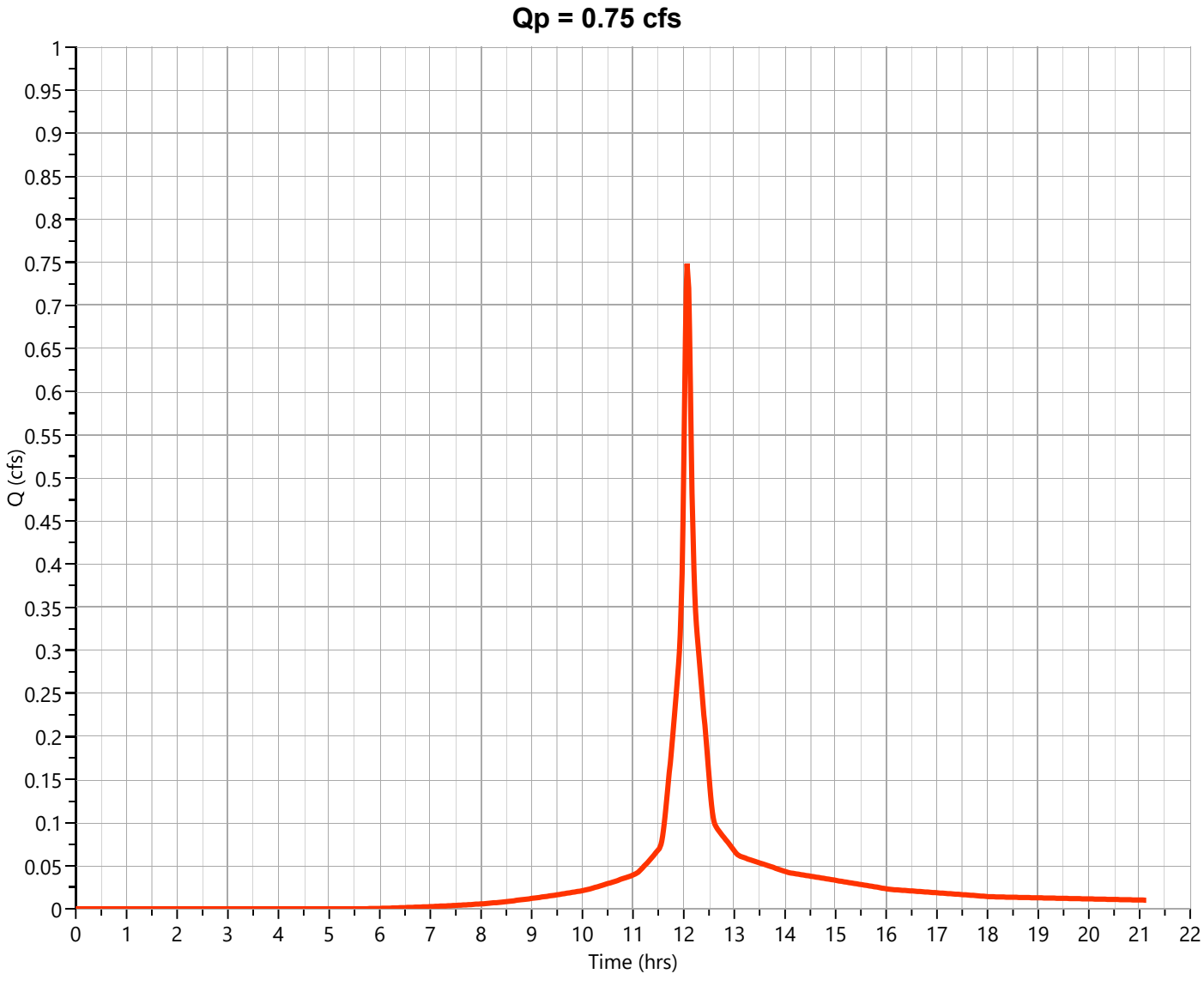
E2 - Ex. to Walbrid

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.749 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 2,347 cuft
Drainage Area	= 0.107 ac	Curve Number	= 78.34*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.46 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.034	89	Millings E2A
0.011	98	Pavement E2B
0.062	69	Grass/Mulch E2C
0.107	**78**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

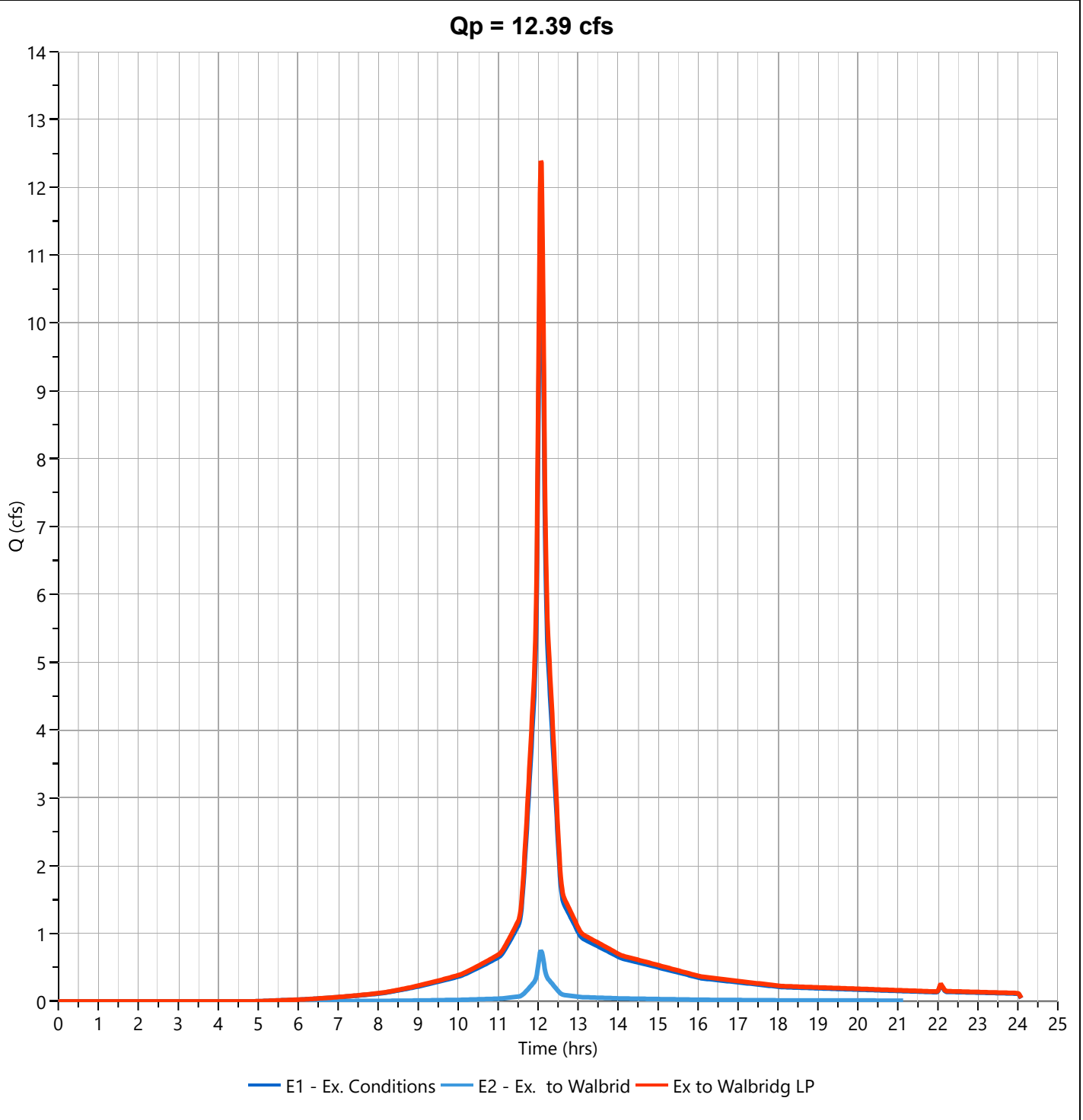
Hydrology Studio v 1.0.0.0

03-19-2020

Pre Ex to Walbridg LP

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 12.39 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 39,165 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 1.693 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

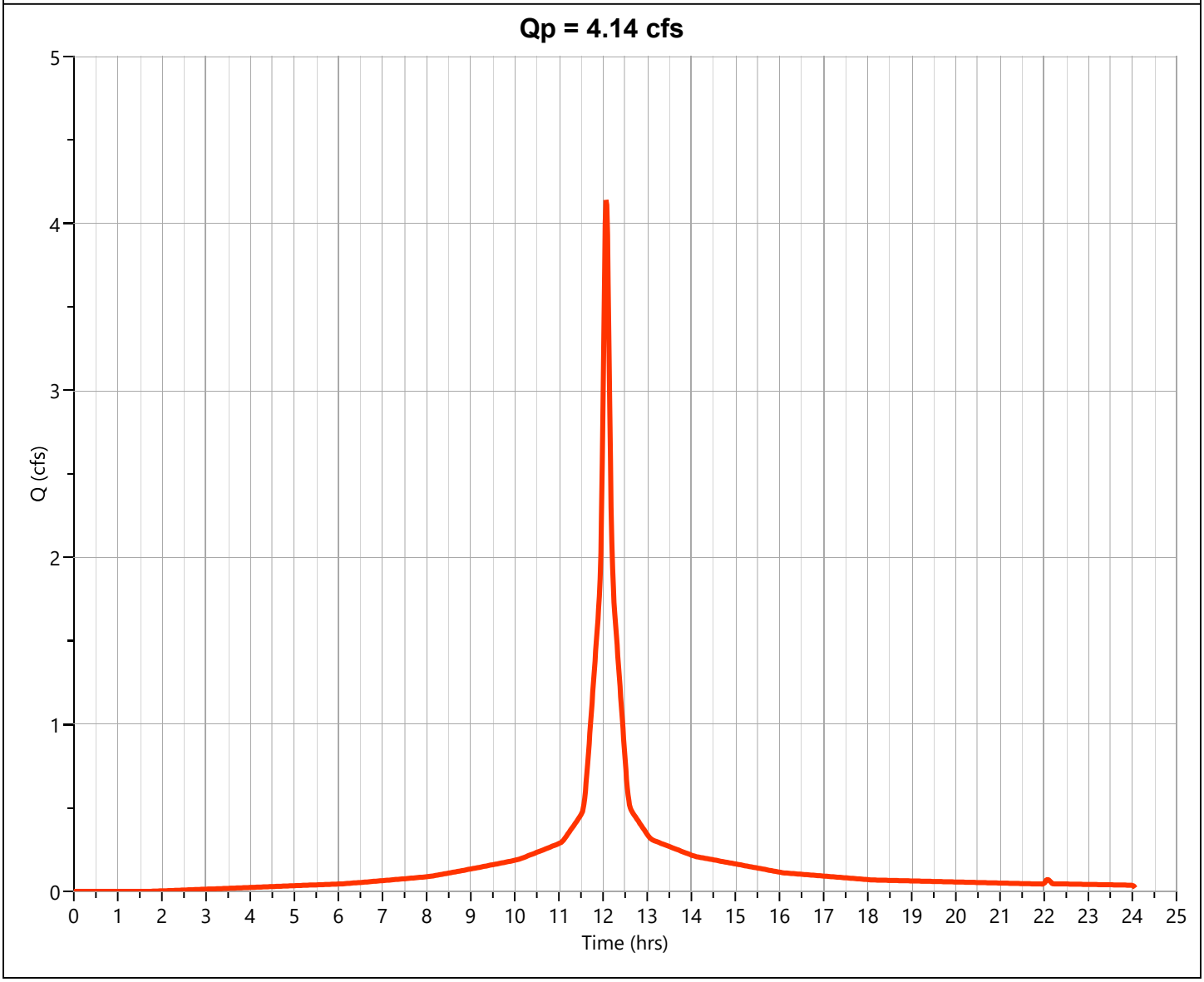
P1 - Maintenance Yd

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.140 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 14,128 cuft
Drainage Area	= 0.491 ac	Curve Number	= 93.56*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.46 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.43	98	P1A - Paved/Maint Bldg Roof
0.036	61	P1B - Grass
0.025	64	P1C - Landscaped Berm
0.491	**94**	Weighted CN Method Employed



Hydrograph Report

Hydrology Studio v 1.0.0.0

03-19-2020

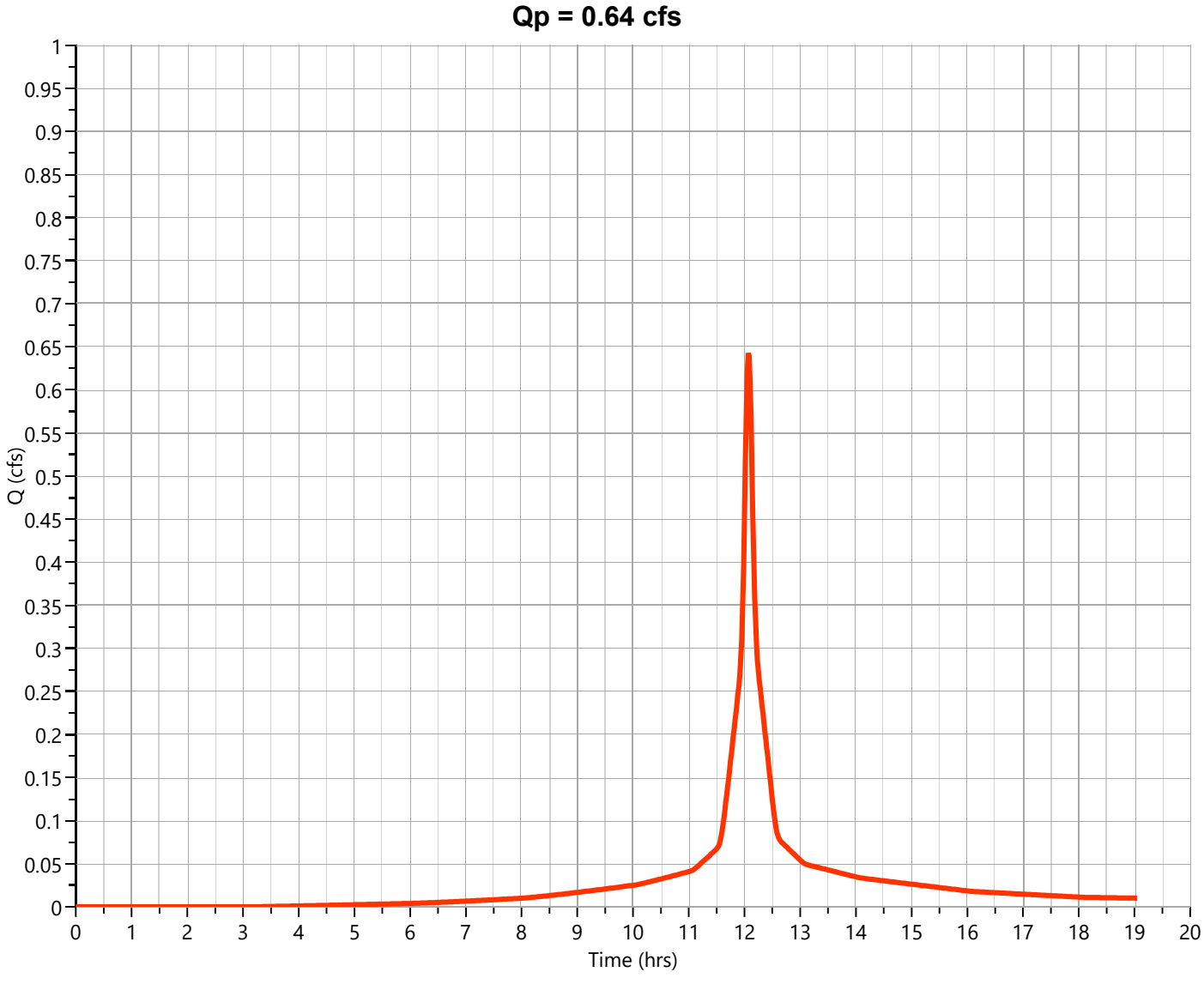
P2 - Upper walkways

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.643 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 2,102 cuft
Drainage Area	= 0.08 ac	Curve Number	= 88*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.46 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.065	62	P2C Grass
0.129	61	P2D, E, F, G, H Grass
0.12	64	P2J Grass/Mulch
0.08	**88**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

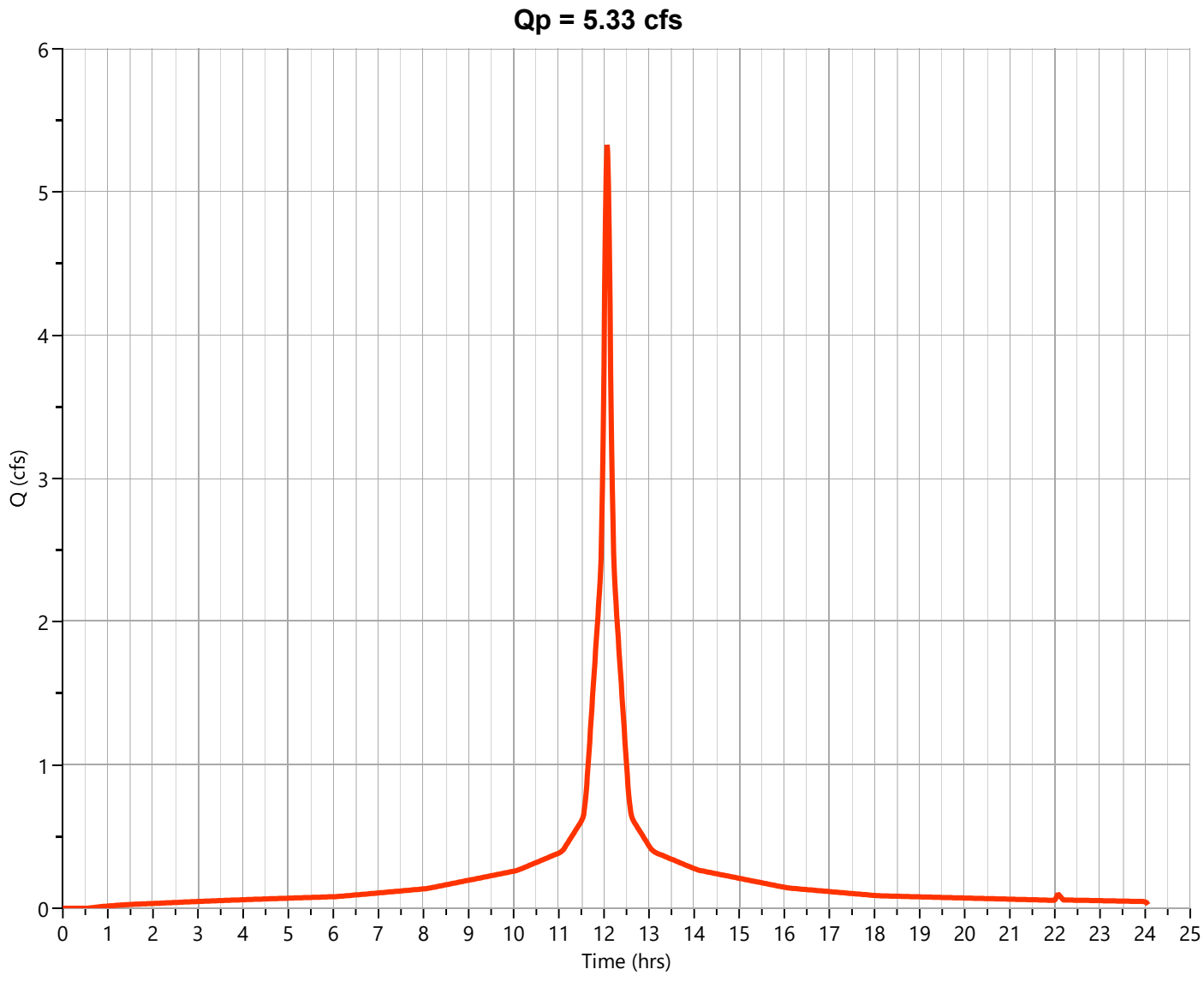
P2 - Parking Lot

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.329 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Runoff Volume	= 19,078 cuft
Drainage Area	= 0.62 ac	Curve Number	= 98*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.46 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.537	98	P2A - Impervious
0.084	98	P2B - Impervious
0.62	**98**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

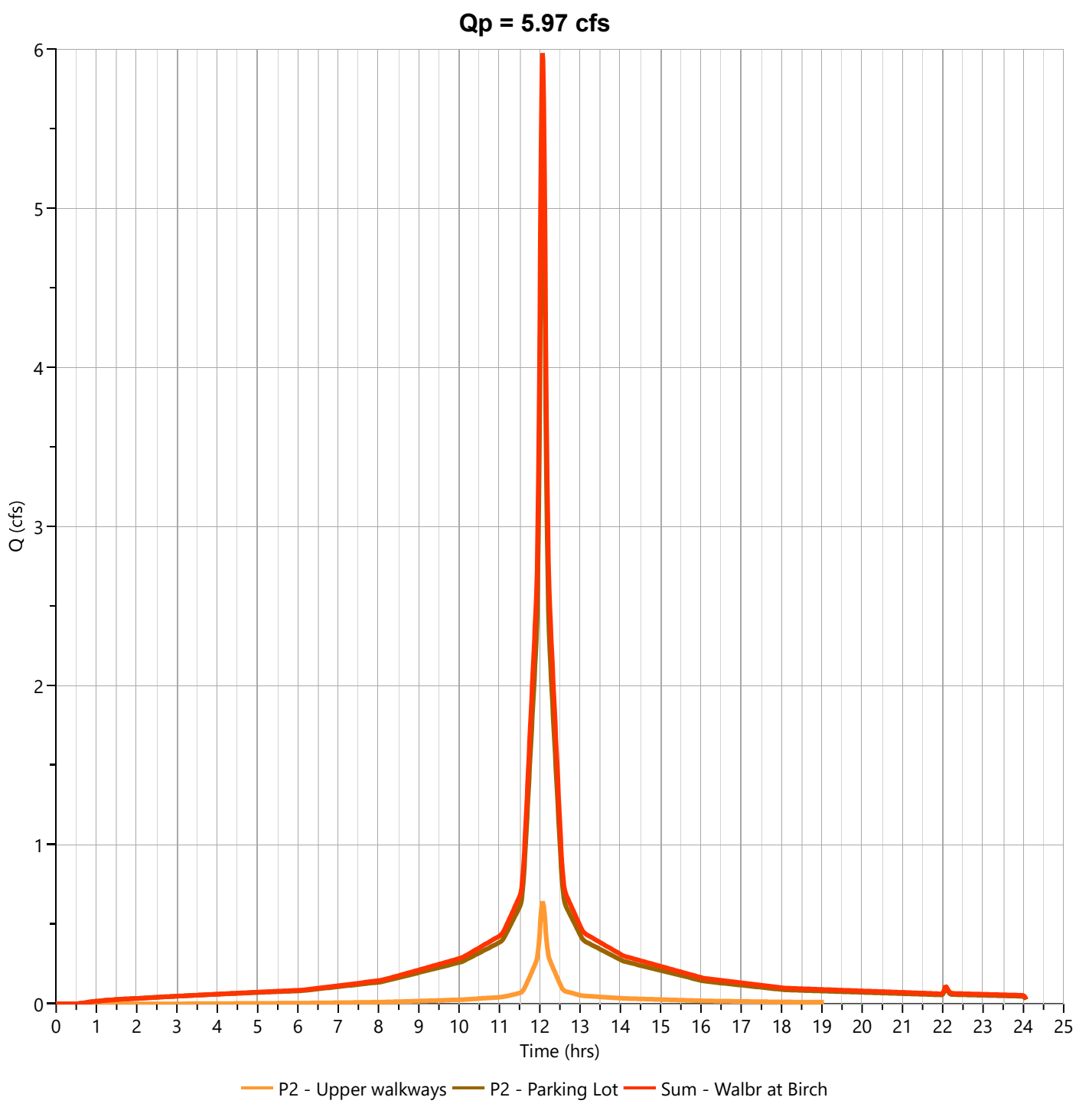
Hydrology Studio v 1.0.0.0

03-19-2020

Sum - Walbr at Birch

Hyd. No. 7

Hydrograph Type	= Junction	Peak Flow	= 5.972 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 21,180 cuft
Inflow Hydrographs	= 5, 6	Total Contrib. Area	= 0.7 ac



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

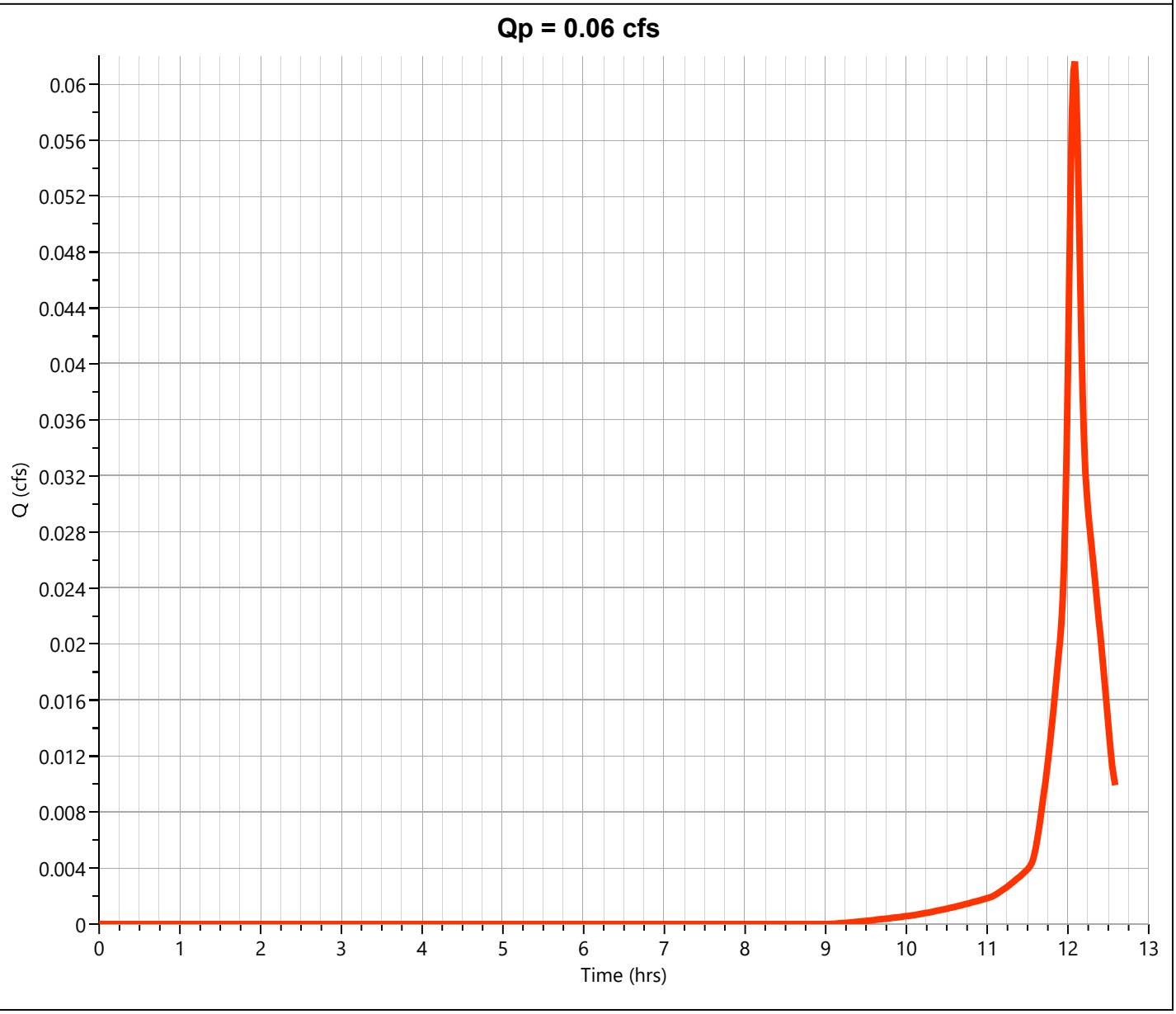
P3 - Walbridge West

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.062 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Runoff Volume	= 191 cuft
Drainage Area	= 0.013 ac	Curve Number	= 62*
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.46 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.013	62	P3A - Grass
0.013	**62**	Weighted CN Method Employed



Hydrograph Report

Project Name: Elizabeth Park Parking

Hydrology Studio v 1.0.0.0

03-19-2020

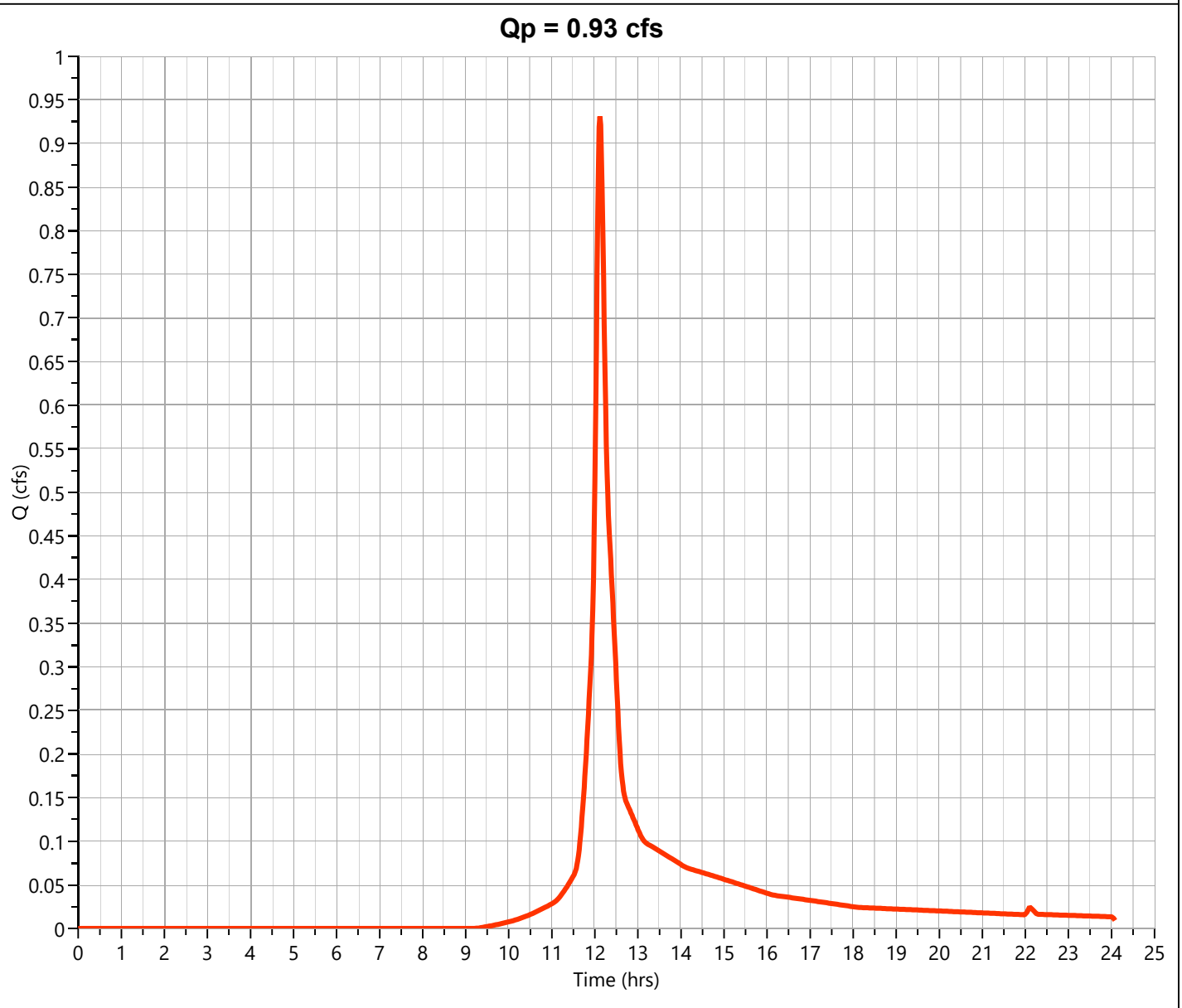
P4 - Area to WQB

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.931 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 3,213 cuft
Drainage Area	= 0.233 ac	Curve Number	= 61*
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 8.46 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.233	61	P4A - Pervious (grass/mulch)
0.233	**61**	Weighted CN Method Employed



Hydrograph Report

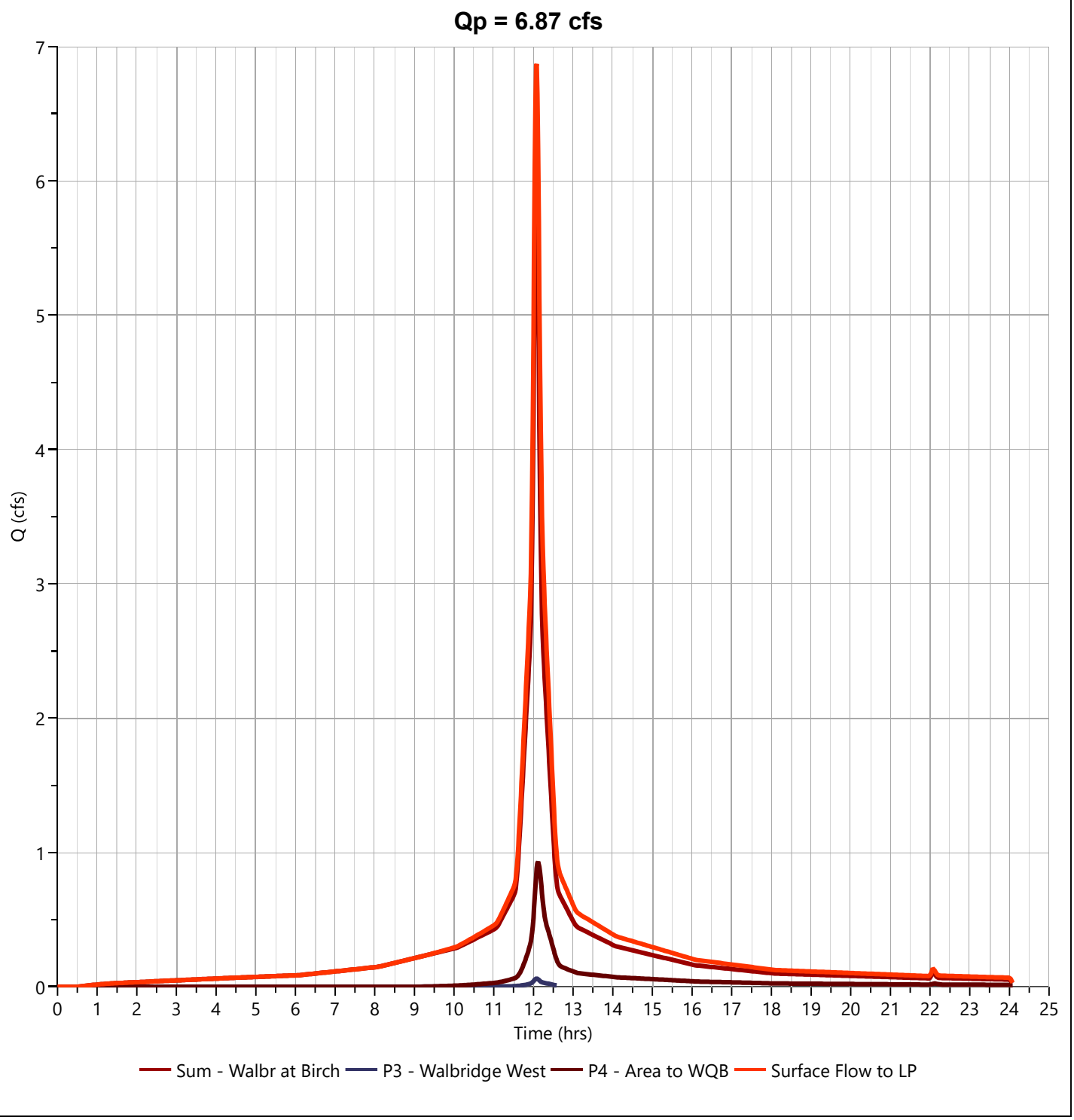
Hydrology Studio v 1.0.0.0

03-19-2020

Post Surface Flow to LP

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 6.870 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.08 hrs
Time Interval	= 1 min	Hydrograph Volume	= 24,584 cuft
Inflow Hydrographs	= 7, 8, 9	Total Contrib. Area	= 0.946 ac



Hydrograph Report

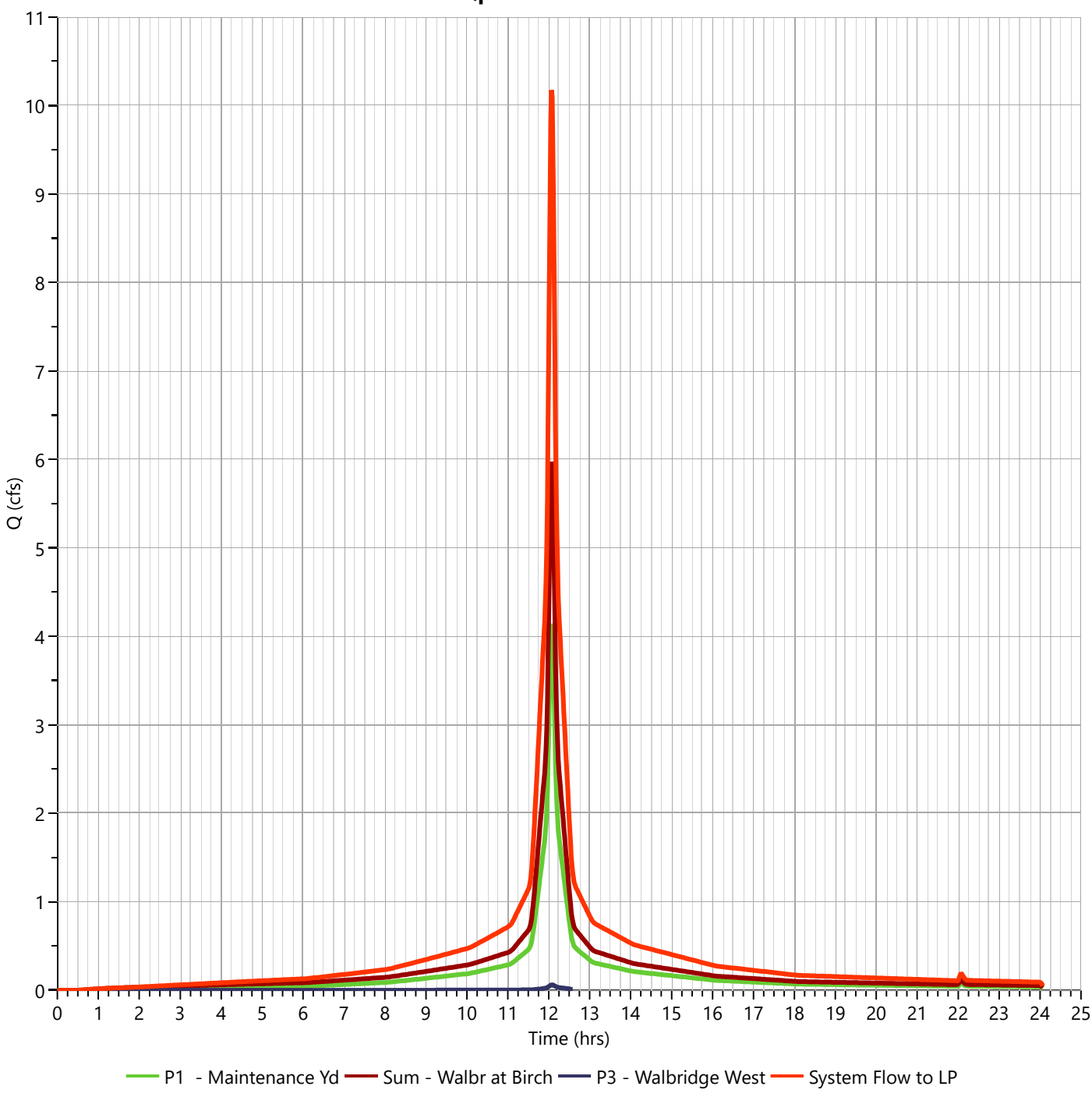
Hydrology Studio v 1.0.0.0

03-19-2020

Post System Flow to LP

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 10.17 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 1 min	Hydrograph Volume	= 35,498 cuft
Inflow Hydrographs	= 4, 7, 8	Total Contrib. Area	= 1.204 ac



Design Storm Report

Custom Storm filename: Bridgeport - 24 HR.cds

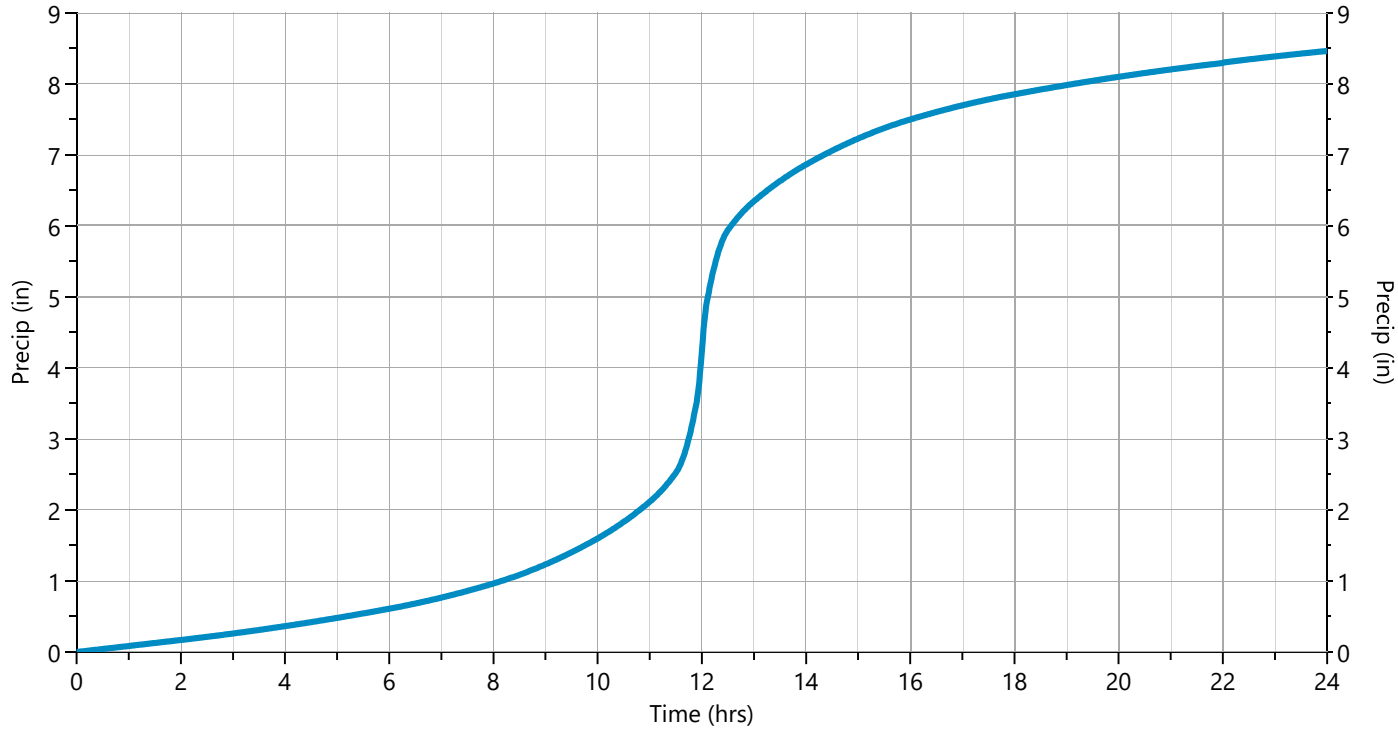
Hydrology Studio v 1.0.0.0

03-19-2020

Storm Distribution: NRCS/SCS - Type III

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	✔ 100-yr	
24 hrs	2.64	3.30	0.00	4.39	5.30	6.54	7.50	8.46	

Incremental Rainfall Distribution, 100-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.50	0.016671	11.68	0.038493	11.87	0.061241	12.05	0.127111	12.23	0.050901
11.52	0.017765	11.70	0.040561	11.88	0.063309	12.07	0.109768	12.25	0.048833
11.53	0.019881	11.72	0.042629	11.90	0.065377	12.08	0.092425	12.27	0.046765
11.55	0.021949	11.73	0.044697	11.92	0.075324	12.10	0.075082	12.28	0.044697
11.57	0.024017	11.75	0.046765	11.93	0.092426	12.12	0.065625	12.30	0.042629
11.58	0.026085	11.77	0.048833	11.95	0.109769	12.13	0.063309	12.32	0.040561
11.60	0.028153	11.78	0.050901	11.97	0.127112	12.15	0.061241	12.33	0.038493
11.62	0.030221	11.80	0.052969	11.98	0.144455	12.17	0.059173	12.35	0.036425
11.63	0.032289	11.82	0.055037	**12.00**	**0.161798**	12.18	0.057105	12.37	0.034357
11.65	0.034357	11.83	0.057105	12.02	0.161410	12.20	0.055037	12.38	0.032290
11.67	0.036425	11.85	0.059173	12.03	0.144454	12.22	0.052969	12.40	0.030221



IDF Report

IDF filename: Farmington.idf

Hydrology Studio v 1.0.0.0

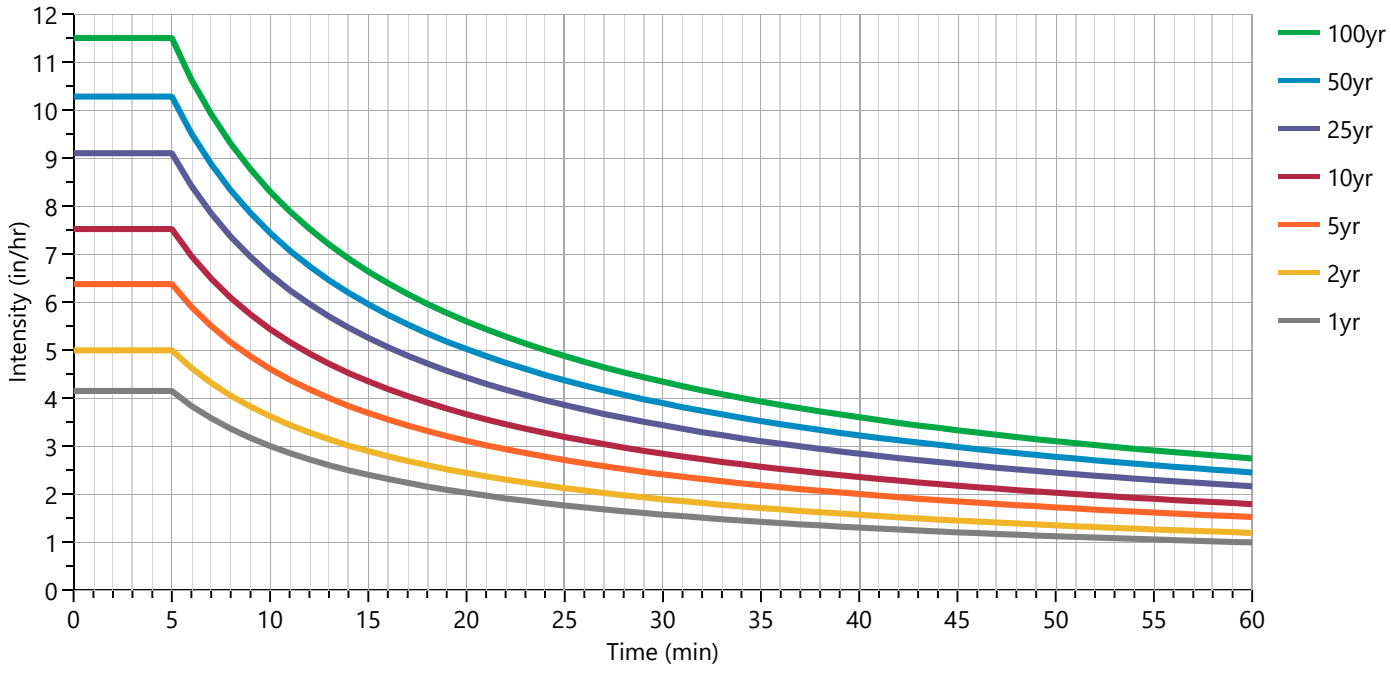
03-19-2020

Equation Coefficients	Intensity = B / (Tc + D)^E (in/hr)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
B	20.2576	24.9217	0.0000	31.2346	36.9453	44.8352	51.2074	55.5061	
D	3.9000	4.0000	0.0000	3.9000	3.9000	3.9000	4.0000	3.8000	
E	0.7258	0.7314	0.0000	0.7271	0.7282	0.7295	0.7309	0.7239	

Minimum Tc = 5 minutes

Tc (min)	Intensity Values (in/hr)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
Cf	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
5	4.14	5.00	0	6.37	7.52	9.10	10.28	11.50	
10	3.00	3.62	0	4.61	5.44	6.57	7.44	8.30	
15	2.40	2.89	0	3.69	4.35	5.25	5.95	6.64	
20	2.02	2.44	0	3.11	3.66	4.43	5.02	5.59	
25	1.76	2.12	0	2.71	3.19	3.85	4.37	4.87	
30	1.57	1.89	0	2.41	2.84	3.43	3.89	4.34	
35	1.42	1.71	0	2.18	2.57	3.10	3.52	3.93	
40	1.30	1.57	0	2.00	2.35	2.84	3.22	3.60	
45	1.20	1.45	0	1.85	2.18	2.63	2.98	3.33	
50	1.12	1.35	0	1.72	2.03	2.45	2.77	3.10	
55	1.05	1.26	0	1.61	1.90	2.29	2.60	2.91	
60	0.99	1.19	0	1.52	1.79	2.16	2.45	2.74	

Cf = Correction Factor applied to Rational Method runoff coefficient.



Precipitation Report

Precipitation filename: West Hartford.pcp

Hydrology Studio v 1.0.0.0

03-19-2020

	Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Active			✔		✔	✔	✔	✔	✔
SCS Storms	**> SCS Dimensionless Storms**								
SCS 6hr		1.83	2.23	0	2.87	3.40	4.13	4.69	5.25
Type I, 24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Type IA, 24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Type II, 24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Type II FL, 24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Type III, 24-hr	✔	2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Synthetic Storms	**> IDF-Based Synthetic Storms**								
1-hr		0.99	1.19	0	1.52	1.79	2.16	2.45	2.74
2-hr		1.23	1.47	0	1.88	2.21	2.66	3.02	3.39
3-hr		1.38	1.65	0	2.11	2.49	3.00	3.40	3.82
6-hr		1.68	2.00	0	2.57	3.03	3.64	4.13	4.66
12-hr		2.04	2.42	0	3.12	3.67	4.41	4.99	5.67
24-hr		2.47	2.92	0	3.78	4.44	5.33	6.03	6.87
Huff Distribution	**> 1st Quartile (0 to 6 hrs)**								
1-hr		0.98	1.18	0	1.51	1.78	2.16	2.46	2.75
2-hr		1.26	1.52	0	1.94	2.29	2.77	3.14	3.51
3-hr		1.45	1.75	0	2.24	2.65	3.21	3.64	4.07
6-hr		1.83	2.23	0	2.87	3.40	4.13	4.69	5.25
Huff Distribution	**> 2nd Quartile (>6 to 12 hrs)**								
8-hr		0	0	0	0	0	0	0	0
12-hr		2.26	2.77	0	3.62	4.32	5.28	6.02	6.77
Huff Distribution	**> 3rd Quartile (>12 to 24 hrs)**								
18-hr		0	0	0	0	0	0	0	0
24-hr		2.64	3.30	0	4.39	5.30	6.54	7.50	8.46
Custom Storms	**> Custom Storm Distributions**								
My Custom Storm 1		0	0	0	0	0	0	0	0
My Custom Storm 2		0	0	0	0	0	0	0	0
My Custom Storm 3		0	0	0	0	0	0	0	0
My Custom Storm 4		0	0	0	0	0	0	0	0
My Custom Storm 5		0	0	0	0	0	0	0	0
My Custom Storm 6		0	0	0	0	0	0	0	0
My Custom Storm 7		0	0	0	0	0	0	0	0
My Custom Storm 8		0	0	0	0	0	0	0	0
My Custom Storm 9		0	0	0	0	0	0	0	0
My Custom Storm 10		0	0	0	0	0	0	0	0

Precipitation Report Cont'd

	Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Active			✔		✔	✔	✔	✔	✔
Huff Indiana	**> Indianapolis**								
30-min		0	0	0	0	0	0	0	0
1-hr		0	0	0	0	0	0	0	0
2-hr		0	0	0	0	0	0	0	0
3-hr		0	0	0	0	0	0	0	0
6-hr		0	0	0	0	0	0	0	0
12-hr		0	0	0	0	0	0	0	0
24-hr		0	0	0	0	0	0	0	0
Huff Indiana	**> Evansville**								
30-min		0	0	0	0	0	0	0	0
1-hr		0	0	0	0	0	0	0	0
2-hr		0	0	0	0	0	0	0	0
3-hr		0	0	0	0	0	0	0	0
6-hr		0	0	0	0	0	0	0	0
12-hr		0	0	0	0	0	0	0	0
24-hr		0	0	0	0	0	0	0	0
Huff Indiana	**> Fort Wayne**								
30-min		0	0	0	0	0	0	0	0
1-hr		0	0	0	0	0	0	0	0
2-hr		0	0	0	0	0	0	0	0
3-hr		0	0	0	0	0	0	0	0
6-hr		0	0	0	0	0	0	0	0
12-hr		0	0	0	0	0	0	0	0
24-hr		0	0	0	0	0	0	0	0
Huff Indiana	**> South Bend**								
30-min		0	0	0	0	0	0	0	0
1-hr		0	0	0	0	0	0	0	0
2-hr		0	0	0	0	0	0	0	0
3-hr		0	0	0	0	0	0	0	0
6-hr		0	0	0	0	0	0	0	0
12-hr		0	0	0	0	0	0	0	0
24-hr		0	0	0	0	0	0	0	0
NRCS Storms	**> NRCS Dimensionless Storms**								
NRCS MSE3, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE4, 24-hr		0	0	0	0	0	0	0	0

Appendix C

Wetlands Description, Assessment, and Impacts Analysis Report

JMM WETLAND CONSULTING SERVICES, LLC

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Newtown, CT 06482

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March 19, 2020

Town of West Hartford
Inland Wetlands and Watercourses Commission
50 South Main Street
West Hartford, CT 06107

Re: ***Wetlands Description, Assessment, and Impacts Analysis***
Visitor Center and Parking Lot – Elizabeth Park
1563 Asylum Avenue, West Hartford, CT

JMM Job # 18-2245-WHT-2

Dear Commissioners:

Mr. James McManus of JMM Wetland Consulting Services, LLC (JMM) has prepared this document to be submitted as part of an application before the Town of West Hartford Inland Wetlands and Watercourses Agency (the IWWA", "the Agency"), pursuant to the provisions of the Inland Wetlands and Watercourses Act, Connecticut General Statutes (CGS Sections 22a-36 to 22a-45), as amended, and the Town of West Hartford Inland Wetlands and Watercourses Regulations, adopted June 19th, 1974, and amended through April 1st, 2013.

Specifically, JMM reviewed only a portion of the overall site at this time for regulated wetlands. The location is in the western portion of Elizabeth Park just east of Walbridge Road, and north and south of the existing maintenance building and visitor center.

We are providing herein our *Summary of Findings* with an overview of the site's regulated resources and other environmental features, as well as an analysis of the proposed conditions, as they relate to regulated wetlands and watercourses.

JMM visited the site on March 18th, 2018 to delineate the wetlands areas within the study area, as well as to obtain baseline data and characterize and inventory wetlands and uplands.

1.0 EXISTING CONDITIONS

1.1 Overview

The study area is located on the east side of Walbridge Road in West Hartford, Connecticut (see Figure 1, attached). The study area is currently comprised of existing buildings (maintenance facility/bathrooms, visitor center), maintained lawn areas, landscaped areas, formal gardens, paved/dirt driveways and parking areas, forested upland areas, and forested and wet maintained lawn wetland areas. The study area is situated within an overall area of the park that has been the subject of disturbances (e.g., grading, filling, clearing, etc.) for many decades. This is based on review of archival aerial photographs, starting with flight year 1934 (i.e., Fairchild aerials).

1.2 Regulated Wetland Areas

1.2.1 JMM-#-Series

The JMM-#-Series wetland is located in the southwestern portion of the study area and along and to the west of a dirt/woodchip maintenance drive. This wetland is characterized as a wooded swamp that shows signs of disturbance throughout (see photos 1-2, attached). JMM wetland boundary markers JMM-1 to JMM-24 demarcate this regulated wetland within the study area.

The wetland resource is classified as a *palustrine, forested, broad-leaved deciduous* (PFO1) wetland, per the National Wetlands Inventory (NWI) classification system. The dominant hydrologic regime within this forested swamp is *seasonally saturated* to *seasonally flooded* (see appended definitions). The wetland's hydro-geomorphic classification (HGM) is predominately *surface* and *groundwater slope*.

Typical vegetation observed within the JMM #-series include such species as red maple, spicebush, Morrow's honeysuckle (invasive), mountain laurel, common elderberry, skunk cabbage, Joe-pye-weeds, Japanese knotweed (invasive), soft rush, sensitive fern,

goldenrods, Asiatic bittersweet (invasive), and poison ivy, to name a few. The observed soils were found to be a mix of poorly drained disturbed and undisturbed soils.

1.2.2 JMM-A-Series

The JMM-A-Series wetland is located southern portion of the study area, and to the east of the #-series wetland and the aforementioned a dirt/wood chip access drive. This wetland is a disturbed isolated wetland (see photos 3 and 4). JMM wetland boundary markers JMM-A-1 to JMM-A-8 (closed loop) demarcate this regulated wetland.

This wetland resource is classified as a *palustrine, forested, broadleaved deciduous* (PFO1) wetland, per the National Wetlands Inventory (NWI) classification system. The dominant hydrologic regime within this wetland is *seasonally saturated* to *seasonally flooded*. The wetland's hydro-geomorphic classification (HGM) is predominately *surface* and *groundwater depression*.

The vegetation observed within the JMM A-series was very similar to what was noted within the #-series. The observed soils were found to be disturbed poorly drained soils.

1.2.3 JMM-B-Series

The JMM-B-Series wetland is located in the northern portion of the study area and to the north of the existing maintenance building and visitor center. This wetland is a disturbed seasonally saturated wetland within wet maintained lawn (see photos 5 and 6). JMM wetland boundary markers JMM-B-1 to JMM-B-19 demarcate this regulated wetland.

This wetland resource could be classified as a *palustrine, forested, broad-leaved deciduous* (PFO1) wetland, per the National Wetlands Inventory (NWI) classification system. However, this wetland does not have a woody understory and its herbaceous layer is maintained grassy lawn. The dominant hydrologic regime within this wetland is *seasonally saturated*. The wetland's hydro-geomorphic classification (HGM) is predominately *surface water depression*.

Typical vegetation observed with the B-series included such species as red maple, pin oak, swamp white oak, common elderberry, sedges, grasses, and soft rush, as well as others. The observed soils were found to be disturbed and poorly drained.

2.0 Soils

The soils types within the study area were found to be mainly disturbed throughout; however, some relatively undisturbed soils were observed in areas. The undisturbed soils are derived from glacial till (i.e. unstratified sand, silt and rock) deposits. The "upland type" soils are comprised of the moderately well drained Ludlow (40) soil series.

Ludlow loam (40). The Ludlow series consists of deep, moderately well drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till from Triassic materials. They are nearly level to strongly sloping soils on till plains, low ridges and drumloidal landforms. The soils developed in glacial till derived mainly from reddish Triassic sandstone, conglomerate and shale with some basalt. Typically, these soils have a dark brown silt loam surface layer 8 inches thick. The subsoil from 8 to 26 inches is reddish brown loam that is mottled in the lower part. The substratum from 26 to 60 inches is reddish brown, mottled, very firm fine sandy loam.

Any undisturbed "wetland-type" soils were identified as the poorly drained Wilbraham (5) soil series.

Wilbraham silt loam (5). This series consists of deep, poorly drained soils formed in a coarse-loamy mantle underlain by firm, compact glacial till from Triassic materials. They are nearly level to sloping soils located in drainage ways and low lying positions on till plains, low ridges and drumloidal landforms. The soils have developed in glacial till derived mainly from reddish Triassic sandstone, conglomerate and shale with some basalt. Typically, these soils have a dark brown silt loam surface layer 8 inches thick. The subsoil from 8 to 25 inches is reddish brown, mottled silt loam. The substratum from 26 to 60 inches is reddish brown, mottled, very firm fine sandy loam.

As was mentioned above, the majority of the study areas soils are disturbed. The upland and wetland soils are mapped as the Udorthents-Urban Land (306) mapping complex while the disturbed wetland soils were mapped as the Aquents (308w) mapping unit.

Udorthents-Urban Land (306). This soil mapping unit consists of well drained to moderately well drained soils that have been altered by cutting, filling, or grading. The areas either have had two feet or more of the upper part of the original soil removed or have more than two feet of fill material on top of the original soil. *Udorthents-Urban Land* or Made Land soils can be found on any soil parent material but are typically fluvial on glacial till plains and outwash plains and stream terraces.

Aquents (308w). This soil map unit consists of poorly drained and very poorly drained disturbed land areas. They are most often found on landscapes, which have been subject to prior filling and/or excavation activities. In general, this soil map unit occurs where two or more feet of the original soil surface has been filled over, graded or excavated. The *Aquents* are characterized by a seasonal to prolonged high ground water table and either support or are capable of supporting wetland vegetation. *Aquents* are recently formed soils, which have an aquic moisture regime. An aquic moisture regime is associated with a reducing soil environment that is virtually free of dissolved oxygen because the soil is saturated by groundwater or by water of the capillary fringe. The key feature is the presence of a ground water table at or very near to the soil surface for a period of fourteen days or longer during the growing season.

3.0 WETLAND FUNCTIONS & VALUES

Scientific research has shown that wetlands provide many important biological, hydrological and social functions (Mitsch and Gosselink 2000). It is necessary to quantify, to some extent, the relative value of a wetland, water body, or watercourse in regard to these functions to design environmentally sensitive site plans, predict with some confidence the potential impact of a proposed activity, and where unavoidable wetland impacts are to occur, be able to design suitable mitigation. An informal assessment of the major functions and values of the wetland associated with the site was conducted. The wetland functional assessment was based on best professional judgment/experience and the use of some of the standardized evaluation procedures typically used in our region (i.e. *USACOE Descriptive Approach*). At this site the three wetlands were evaluated for their overall functions and values.

Table 1: Summary of Wetland/Watercourse Function-Value Assessment

Function/Value	Wetland #	Wetland A	Wetland B
Groundwater Recharge/Discharge	Y	N	Y
Floodflow Alteration	N	N	N
Sediment/Shoreline Stabilization	N/A	N/A	N/A
Sediment/Toxicant/Pathogen Retention	Y	Y	Y
Nutrient Removal/Retention/Transformation	Y	Y	Y
Production Export	N	N	N
Fish and Aquatic Habitat	N/A	N/A	N/A
Wildlife Habitat	Y	N	Y
Endangered Species Habitat	N	N	N
Visual Quality/Aesthetics	N	N	N
Educational/Scientific Value	N	N	N
Recreation (Passive, Active)	Y	N	**P**
Uniqueness/Heritage	N	N	N

Notes: *P = Principal function; Y = function present; N = function not appreciably present or absent*

Overall the functions and values of the on-site wetlands are assessed to be of *low* to *very low*, being disturbed for many decades. The only exception is for *recreation* (value), which would be a *principal* value, as it is part of a long-standing open space area (i.e., park). This is particularly the case for the JMM-B-series wetland.

4.0 PROPOSED CONDITIONS

4.1 Introduction

According to the reviewed plans, entitled V*isitors Center Parking Lot and Maintenance Yard*, prepared by ToDesign, LLC, of New Britain, CT, and dated February 21, 2020, revised through March 23, 2020, facility improvements and expansion of parking areas are proposed, associated with the maintenance facility and visitor center. These improvements include landscaping, and a formal stormwater system that will collect and treat stormwater runoff.

4.2 Direct Wetland Impacts

This proposal would not result in any *direct* wetland impacts per the reviewed plans for the parking lot.

4.3 Potential Indirect Wetland Impacts

The long-term and short-term *indirect* impacts have been analyzed for this proposal. They are typically associated with short-term construction activities, stormwater runoff, and visual and auditory disturbance to the wildlife utilizing a wetland or watercourse.

The potential for any of these indirect impacts to occur at the site as a result of the proposal depends on the regulated resources themselves, their sensitivity, their ecological and physical characteristics, and the degree to which they provide recognized functions and values. These *potential* impacts are discussed below.

Erosion and Sedimentation

The potential for soil erosion and subsequent deposition in wetlands or watercourses exists at every construction site that involves soil disturbance. At this site the risk or the potential for adverse impacts from erosion and sedimentation is considered *moderate*. The primary reasons for this assessment are as follows: (1) a detailed erosion and sedimentation control

plan has been prepared and submitted, which complies with the CT DEEP's 2002 *Connecticut Guidelines for Erosion and Sediment Control*, as well as any recent guidelines promulgated by regulatory agencies; and (2) the site's undisturbed soils are moderately erosive mainly due to finer texture soils within the portions of the study area (see attached K-factor assessment). However, the slopes within the development area are relatively gentle, which reduces the risk of significant erosion and sedimentation.

It should be noted that prior to the start of any construction activities, standard erosion and sedimentation controls will be installed that would be protective of the adjacent wetland resource areas. The sedimentation barriers, specifically the entrenched siltation fence, will be inspected and maintained throughout the duration of construction and site disturbance. Any controls that are not performing as intended will be replaced, and/or removed or any other areas of the site that may need additional controls will be addressed. Erosion controls measures will not be removed until the areas are stabilized, or at the direction of the Town of West Hartford Inland Wetlands and Watercourses Agency.

Removal of Native Vegetation and Habitat Loss

Habitat loss associated with land clearing is an unavoidable consequence of land development, which has the potential of impacting wetlands and watercourses. Within the study area, an effort has been made to limit any disturbance of woody vegetation to the extent possible.

The proposed plans show that the overwhelming majority of the proposed earthwork associated with the proposal will be accomplished with the existing developed area or where minimal woody vegetation exists. Limited removal of woody vegetation within the regulated area (i.e., upland review area) will take place.

Potential Impacts to Wetland Hydrology and Stream Flow

The hydrologic and flow regime of #-series is dependent predominately on contributions from its watershed and direct precipitation. For the most part this wetland, as well as the other delineated and shown on the plans, are saturated at or near the surface of the ground early in the growing season, with only limited water available as the season progresses or after rainstorms. The proposed improvements will not substantially or adversely change the hydrologic regime of the delineated wetlands within the study area.

Potential Water Quality Impacts

Stormwater runoff from impervious surfaces have the potential of degrading the water quality (i.e., surface and groundwater) of regulated resources. Generation of potential pollutants on impervious surfaces typically results from vehicular traffic over them.

The CT-DEEP's 2004 *Stormwater Quality Manual* ("the Manual") is used to guide the selection, design, siting, and sizing of appropriate best management practices (BMPs), which are protective of surface and groundwater quality. The CT-DEEP has adopted, through their General Permit for discharge of stormwater, an 80% TSS (total suspended solids) minimum annual removal goal, because research has shown that the concomitant removal of other runoff constituents is high at these levels of TSS removal.

Under existing conditions there are no controls with regard to stormwater renovation, primarily from the maintenance facility, including sediment and other materials associated with outside storage (e.g. storage bins). However, under proposed conditions a more formal system is proposed, including the addition of a catch-basin with a sump and hooded outlet to trap floatables in the area of the relocated storage bins. Runoff associated with the new parking areas will sheet flow to its southern curb-less edge directly into a proposed landscaped water quality impoundment area with roughly one foot of storage capacity. We note that the wetland to which the storm runoff will discharge, via a level weir, is highly disturbed at this location. Therefore, it is JMM's opinion that the proposed handling of runoff from the site will protect downgradient regulated resources.

4.4 Alternatives

Section 7.5g of the Town of West Hartford Inland Wetlands and Watercourses Regulations, require applicant's to consider "alternatives which would cause less or no environmental impact to wetlands or watercourses." The proposal has gone through an iterative analysis, whereby direct impacts to regulated areas were eliminated. Moreover, potential indirect impacts (i.e., short-term and long-term) were minimized to such an extent that no adverse impacts to these resources are expected. In fact, an improvement to the water quality of the wetlands, and specifically the JMM-#-series wetland, is expected through the incorporation of a formal stormwater management system. As a result, it is JMM's professional opinion that the proposal constitutes the preferred alternative, being both feasible and prudent, and not resulting in adverse impacts.

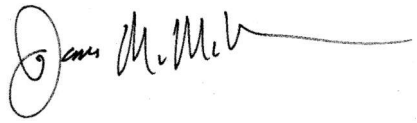
5.0 CONCLUSION

In conclusion, it is JMM's professional opinion that as proposed, and with diligent monitoring of erosion and sediment controls, the proposal will not have significant adverse short-term (construction) or long-term (water quality/habitat) adverse impacts upon the regulated resources or the functions and values provided by them under existing conditions.

Please call us if you have any questions on the above or if further analysis on proposed conditions is necessary.

Respectfully submitted,

JMM WETLAND CONSULTING SERVICES, LLC



James M. McManus, MS, CPSS
Certified Professional Soil Scientist (No. 15226)

Attachments: Figure 1, Photos 1-6, NRCS Web Soil Survey, K-Factor Erodibility Assessment Wetland Classification Definitions

FIGURE 1: Elizabeth Park, Hartford, CT

Property Information

Property ID	0181 1 1563 0001
Location	1563 ASYLUM AVENUE
Owner	CITY OF HARTFORD

TOWN OF WEST HARTFORD

MAP FOR REFERENCE ONLY
NOT A LEGAL DOCUMENT

Town of West Hartford, CT makes no claims and no warranties, expressed or implied, concerning the validity or accuracy of the GIS data presented on this map.

Parcels updated 5/1/2016
Properties updated Daily

Photo 1: View of wooded swamp within the southern part of the study area (JMM-#-series) (JMM photo taken 3/18/18); facing westerly

Photo 2: View of wooded swamp within the southern part of the study area (JMM-#-series) (JMM photo taken 3/18/18); facing northeasterly

Photo 3: View of wooded swamp within the southern part of the study area (JMM-A-series) (JMM photo taken 3/18/18); facing southerly

Photo 4: View of wooded swamp within the southern part of the study area (JMM-A-series) (JMM photo taken 3/18/18); facing northeasterly

Photo 5: View of wet maintained lawn within the northern part of the study area (JMM-B-series) (JMM photo taken 3/18/18); facing northwesterly

Photo 6: View of wet maintained lawn within the northern part of the study area (JMM-B-series) (JMM photo taken 3/18/18); facing northwesterly

Soil Map—State of Connecticut
(Elizabeth Park, West Hartford, CT)

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 16, Sep 15, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

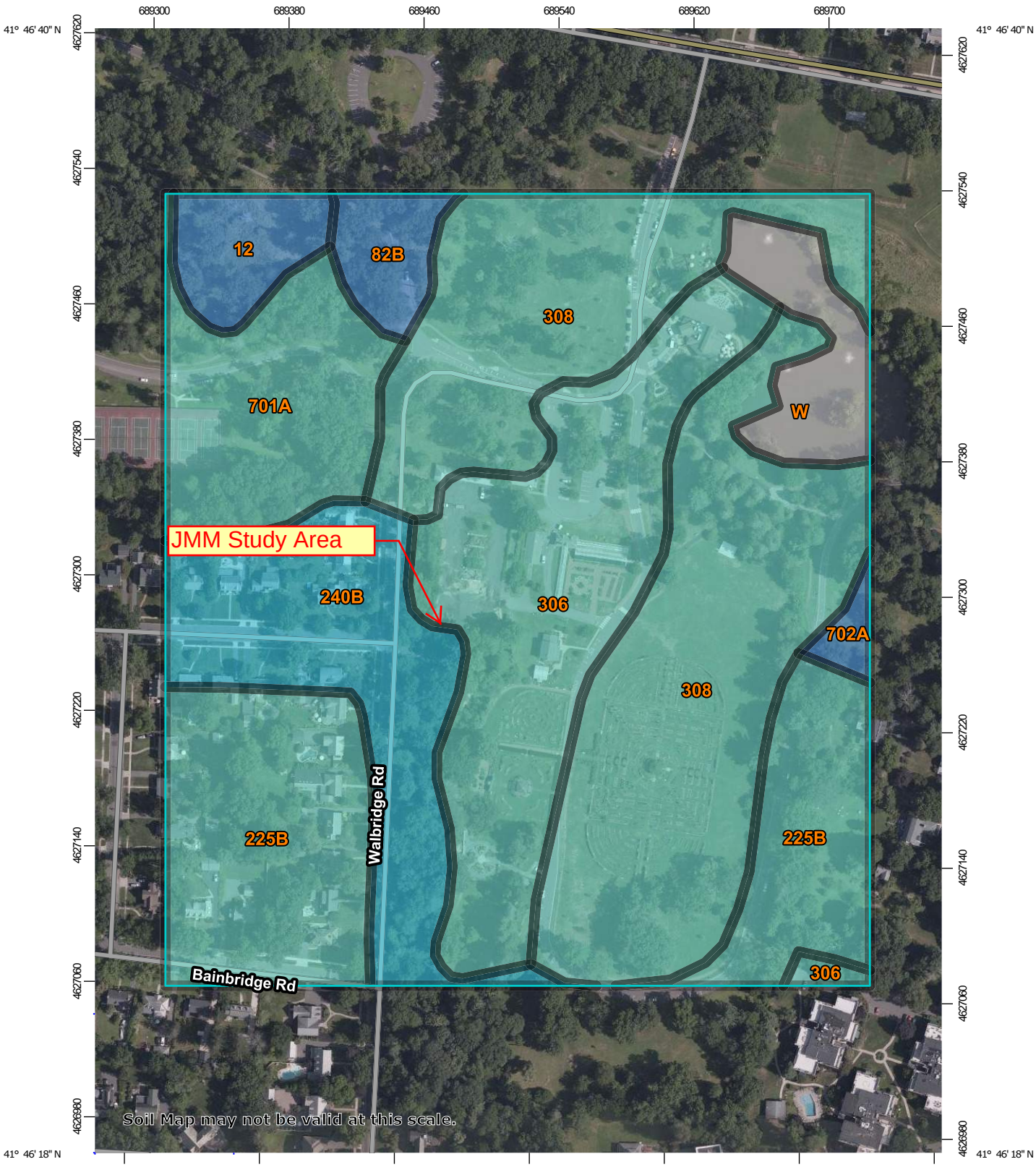
Date(s) aerial images were photographed: Mar 28, 2011—Apr 18, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12	Raypol silt loam	2.6	2.1%
21A	Ninigret and Tisbury soils, 0 to 5 percent slopes	12.0	9.7%
29B	Agawam fine sandy loam, 3 to 8 percent slopes	5.0	4.0%
29C	Agawam fine sandy loam, 8 to 15 percent slopes	2.5	2.0%
82B	Broadbrook silt loam, 3 to 8 percent slopes	2.5	2.0%
225B	Brancroft-Urban land complex, 0 to 8 percent slopes	20.7	16.6%
237A	Manchester-Urban land complex, 0 to 3 percent slopes	16.3	13.1%
240B	Ludlow-Urban land complex, 0 to 8 percent slopes	12.2	9.8%
282B	Broadbrook-Urban land complex, 3 to 8 percent slopes	0.1	0.1%
287B	Wethersfield-Urban land complex, 3 to 8 percent slopes	6.3	5.0%
306	Udorthents-Urban land complex	16.5	13.2%
308	Udorthents, smoothed	25.8	20.7%
W	Water	2.3	1.8%
Totals for Area of Interest		**124.6**	**100.0%**

K Factor, Whole Soil—State of Connecticut
(1563 Asylum Avenue, West Hartford, CT)



Map Scale: 1:3,240 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Lines
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Points
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 19, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 15, 2019—Aug 29, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Whole Soil

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12	Raypol silt loam	.43	1.4	2.9%
82B	Broadbrook silt loam, 3 to 8 percent slopes	.43	1.1	2.3%
225B	Brancroft-Urban land complex, 0 to 8 percent slopes	.32	8.4	17.4%
240B	Ludlow-Urban land complex, 0 to 8 percent slopes	.37	5.9	12.3%
306	Udorthents-Urban land complex	.32	8.7	18.0%
308	Udorthents, smoothed	.32	16.3	33.7%
701A	Ninigret fine sandy loam, 0 to 3 percent slopes	.32	4.3	8.9%
702A	Tisbury silt loam, 0 to 3 percent slopes	.43	0.3	0.7%
W	Water		1.9	3.9%
Totals for Area of Interest			**48.4**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

WETLANDS: *The Physical Environment*

COMMON WATER REGIMES OF NORTHEASTERN WETLANDS

Seasonally flooded: Surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface.

Temporarily flooded: Surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season.

Seasonally saturated: The soil is saturated to the surface, especially early in the growing season, but unsaturated conditions prevail by the end of the season in most years. Surface water is absent except for groundwater seepage and overland flow.

Semi-permanently flooded: Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.

Permanently flooded: Water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes.

Saturated: The substratum is saturated to the surface for extended periods during the growing season, but surface water is seldom present. This water regime applies to permanently saturated, non-flooded wetlands such as bogs.

References:

Golet, F. C., A. J. K. Calhoun, W. R. DeRagon, D. J. Lowry and A. J. Gold. 1993. Ecology of Red Maple Swamps in the Glaciated Northeast: A Community Profile. U. S. Dep. Int. Fish Wild. Serv. Biol. Rep. 12, 152 pp.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U. S. Fish Wild. Serv. Biol. Serv. Program FWS-OBS 79/31. 103 pp.

WETLANDS: *The Physical Environment*

WETLAND HYDROGEOMORPHIC CLASSIFICATION

Surface-Water Depression Wetlands: In these wetlands, precipitation and overland flow (surface runoff) collect in a depression where there is little or no groundwater discharge. Water leaves the wetland principally by evaporotranspiration and infiltration (groundwater recharge). The wetland hydrologic system lies above the local or regional groundwater system and is isolated from it by an unsaturated zone; thus, it is said to be "perched." In the glaciated Northeast, surface-water depression wetlands are most likely to form over bedrock or till deposits in topographically elevated areas of landscape; however, they may develop in lowland kettles or ice-block basins that formed in glaciolacustrine or fine-textured glaciofluvial deposits.

Surface-Water Slope Wetlands: These wetlands are located along the edge of stream or lake or on the sloping surface of a floodplain. They may occur on till or stratified drift but are commonly found on alluvium. While precipitation and overland flow also feed these wetlands, the principal source of water is the overflow of the adjacent water body. The sloping surface of the wetland permits water to drain readily back to the lake or river as its stage falls. As was the case with the previous class, the wetland surface usually lies well above the local water table, so groundwater discharge to the wetland is negligible or nonexistent. Groundwater recharge from the wetland is possible, depending on the permeability of underlying surficial deposits.

Groundwater Depression Wetlands: These wetlands occur where a basin intercepts the local groundwater table, so that groundwater discharge as well as precipitation and overland flow feed the wetland. Classic groundwater depression wetlands have no surface drainage leaving the site; however, occasional streamflow out may occur form basin overflow. Groundwater inflow may be continuous or seasonal, depending upon the depth of the basin and the degree of fluctuation of the local water table. During periods when the wetland water level is higher than the local groundwater table (e.g., after major precipitation events in dry season), groundwater recharge may occur. Groundwater may enter the wetland basin from all directions, or it may discharge in one area and recharge in another. In the glaciated Northeast, groundwater depression wetlands are most likely to occur in stratified drift, particularly in coarse-textured glaciofluvial deposits where relatively rapid movement between groundwater and surface water can occur.

Groundwater Slope Wetlands: These wetlands occur where groundwater discharges as springs or seeps at the land surface and drains away as streamflow. Most commonly, these wetlands occur on hillsides over till deposits or at the base of hills where stratified drift and till come into contact. Headwater wetlands are typically groundwater slope wetlands. The local water table slopes toward the wetland surface. Where groundwater flow is continuous, the soil remains saturated. At many sites, however, groundwater inputs cease during late summer or early fall as evaporotranspiration depletes soil moisture in the root zone, in which case the soil is only seasonally saturated. Permanent ponding of water is prevented by the sloping land surface, but water may collect temporarily in isolated depressions. Precipitation and overland flow provide additional water to the wetland on an intermittent basis. Groundwater recharge may occur in the wetland after such events, but amounts are likely to be negligible, especially where wetland soils have formed over dense lodgment till deposits. Where such deposits are present, groundwater slope wetlands may be fed primarily by shallow groundwater systems perched above the regional system.

Reference:

Golet, C.G., A.J.K. Calhoun, W.R. DeRagon, D.J. Lowry, and A.J. Gold. 1993. Ecology of Red Maple Swamps in the Glaciated Northeast: A Community Profile. USFWS. Biological Report No. 12

WETLANDS: *The Plant Community*

WETLAND CLASSES AND SUBCLASSES IN THE GLACIATED NORTHEAST

WETLAND CLASS	WETLAND SUBCLASS
Open Water	(OW-1) Vegetated (OW-2) Floating-leaved (OW-3) Non-vegetated
Deep Marsh	(DM-1) Dead Woody (DM-2) Shrub (DM-3) Sub-shrub (DM-4) Robust (DM-5) Narrow-leaved (DM-6) Broad-leaved
Shallow Marsh	(SM-1) Robust (SM-2) Narrow-leaved (SM-3) Broad-leaved
Meadow	(M-1) Ungrazed (M-2) Grazed
Shrub Swamp	(SS-1) Sapling (SS-2) Bushy (SS-3) Compact (SS-4) Aquatic
Wooded Swamp	(WS-1) Deciduous (WS-2) Evergreen
Bog	(BG-1A) Compact Shrub (BG-1B) Bushy Shrub (BG-2) Wooded (BG-3) Emergent

Note: Subclass (OW-2) has replaced (SM-4)
Seasonally Flooded Class (SF-1 & SF-2) has been removed

Reference:

Golet, F.C., and J.S. Larson. 1974. Classification of freshwater wetlands in the glaciated Northeast. USFWS Resour. Publ. 116. 56 pp.

WETLANDS: *The Physical Environment*

SOIL DRAINAGE CLASSES

Excessively drained: Brightly colored; usually coarse-textured; rapid permeability; very low water-holding capacity; subsoil free of mottles

Somewhat excessively drained: Brightly colored; rather sandy; rapid permeability; low water-holding capacity; subsoil free of mottles

Well drained: Color usually bright yellow, red, or brown; drain excess water readily, but contain sufficient fine material to provide adequate moisture for plant growth; subsoil is free of mottles to a depth of at least 36 inches.

Moderately well drained: Generally any texture, but internal drainage is restricted to some degree; mottles common in the lower part of the subsoil, generally at a depth of 18 to 36 inches; may remain wet and cold later in spring; generally suited for agricultural use.

Somewhat poorly drained: Remain wet for long periods of time due to slow removal of water; generally have a slowly permeable layer within the profile or a high water table; mottles common in the subsoil at a depth of 8 to 18 inches.

Poorly drained: Dark, thick surface horizons commonly; gray colors usually dominate subsoil; water table at or near the surface during a considerable part of the year; mottles frequently found within 8 inches of the soil surface.

Very poorly drained: Generally thick black surface horizons and gray subsoil; saturated by high water table most of the year; usually occur in level or depressed sites and are frequently ponded with water.

Reference:

Wright, W. R., and E. H. Sautter. 1979. Soils of Rhode Island landscapes. R.I. Agric Exp. Station Bull. 429. 42 pp.